



Parks Canada Parcs
Canada Canada

Canada

LACHINE CANAL LIGHTING NETWORK REHABILITATION

SPECIFICATIONS ISSUED FOR ADDENDUM No. 2

*This document should not
be used for purposes of
construction*

SNC-Lavalin Ref. : 645791

SNC-LAVALIN INC.

August 24, 2017

Prepared by:

Gaudence Habimana, Eng.
(Section 01 29 00, divisions 31 and 32 Exterior improvements
and pricing schedule)



This addendum becomes part of the tender documents as originally specified. Its content prevails over tender documents issued to date.

All specifications issued with this **ADDENDUM No. 2** shall be considered part of the bidding documents. Modifications to sections of the tender documents are listed below and included hereafter.

1. CIVIL

1.1 SECTIONS LIST

On each revised page of a given section, the revisions connected to present addendum are identified by a revision number located at the bottom of the page. The revision number appears inside a triangle to indicate a partial revision, whereas it is located next to the section title if an entire page was added or revised in the scope of the addendum.

The following sections are issued with this Addendum:

Section n°	Number of pages
00 01 10.01	3 pages
01 29 00	14 pages
31 05 16	3 pages (new section)
31 23 33.01	12 pages (new section)
32 11 16.01	4 pages (new section)
32 11 23	4 pages (new section)
32 12 16	11 pages (new section)
32 17 23	4 pages (new section)
32 91 19.13	6 pages (new section)
32 92 23	6 pages (new section)

PARKS CANADA LIGHTING NETWORK REHABILITATION LACHINE CANAL		SECTION 00 01 10.01 ELECTRICAL – LIST OF SECTIONS			Issued for Tender	Issued for Addendum No. 1	Issued for Addendum No. 2						
		Page 1											
SECTION N°	TITRE	2017-07-21	2017-08-21	2017-08-24									
2	00 01 10.01	Electrical – List of Sections	0	1	2								
	01 11 01	Work Related General Information	0	1									
	01 14 00	Work Restrictions	0										
2	01 29 00	Payment Procedure	0	1	2								
	01 31 19	Project Meetings	0										
	01 32 16.07	Construction Progress Schedule – Bar Chart (GANNT)	0										
	01 33 00	Submittal Procedures	0										
	01 35 29.06	Health and Safety Requirements	0	1									
	01 35 43	Environmental Procedures	0	1									
	01 41 00	Regulatory Requirements	0										
	01 45 00	Quality Control	0										
	01 52 00	Construction Facilities	0										
	01 56 00	Temporary barriers and enclosures		0									
	01 61 00	Common Product Requirements	0										
	01 73 00	Execution		0									
	01 74 11	Cleaning	0										
	01 74 21	Construction/Demolition – Waste Management and Disposal	0										



PARKS CANADA LIGHTING NETWORK REHABILITATION LACHINE CANAL		SECTION 00 01 10.01 ELECTRICAL – LIST OF SECTIONS			Issued for Tender	Issued for Addendum No. 1	Issued for Addendum No. 2						
		Page 2											
SECTION N°	TITRE	2017-07-21	2017-08-21	2017-08-24									
01 77 00	Closeout Procedures	0											
01 78 00	Closeout Submittals	0											
01 91 13	General Commissioning (CX) Requirements	0											
26 05 00	Common Work Results for Electrical	0											
26 05 20	Wire and Box Connectors 0 – 1,000 V	0											
26 05 21	Wires and Cables (0 – 1,000 V)	0											
26 05 31	Splitters, Junction, Pull Boxes and Cabinets	0											
26 05 34	Conduits, Conduit Fastenings and Fittings	0											
26 05 43 01	Installation of Cables in Trenches and in Ducts	0											
26 28 16 02	Moulded Case Circuit Breakers	0											
26 56 19	Roadway Lighting	0											
2	31 05 16			0									
	31 11 00	0											
2	31 23 33.01			0									
	32 01 90 33	0											
2	32 11 16.01			0									
	32 11 23			0									



PARKS CANADA LIGHTING NETWORK REHABILITATION LACHINE CANAL		SECTION 00 01 10.01 ELECTRICAL – LIST OF SECTIONS Page 3			Issued for Tender	Issued for Addendum No. 1	Issued for Addendum No. 2						
SECTION N°	TITRE	2017-07-21	2017-08-21	2017-08-24									
32 12 16	Asphalt Paving			0									
32 17 23	Pavement Marking			0									
32 91 19.13	Topsoil Placement and Grading			0									
32 92 23	Sodding			0									
33 65 76	Direct Buried Underground Cable Ducts	0											

2



1. GENERAL

1.1 Unit or Lumber Prices

- .1 The total amount of the contract is broken down according to a description of work paid on a flat-rate basis (flat-rate prices) and paid work on a unitary basis (unit prices).
- .2 Each of the unit or lump sum prices to be broken down shall include all expenditures, work, disbursements, payments, direct or indirect costs, mobilizations, demobilizations and acts, all facts, and all responsibilities, obligations, omissions and errors of The Contractor in connection with the completion of this work. These prices also include the transportation and use of materials, the cost of labor, materials, tools and equipment required for the performance of the contract, and all costs Corporate, administration, insurance, contributions, interest, rents, taxes and other incidental expenses. It must include losses and damages that may result from the nature of the work, fluctuations in prices and wages, business risks, strikes, delays not attributable to the Departmental Representative, transportation restrictions, Accidents and the action of the elements of nature.

1.2 Definitions

- .1 Fixed price: where the work is determined in a precise and detailed manner and a price is agreed and accepted by both parties for the whole.
- .2 Unit price: where the specifications for the work are determined in a precise and detailed manner and all quantities on the schedule are provided as an estimate.

2. PRICE SCHEDULE LINE ITEM DESCRIPTIONS

- .1 Site organization
 - .1 This section includes the organization of the site and all elements described in this Part. It is paid on a flat-rate basis and includes all the requirements outlined in Division 1 (General Requirements) of this Specification as well as all other work that is not part of other Schedule items but is necessary for the full the work.

- .2 It also includes the costs of mobilization and demobilization, the cost of purchasing, depreciating or leasing machinery, tools and equipment, personnel, materials, site facilities and any mobilization As may be required to meet the schedule of work.
- .3 Maintenance and operating costs for the maintenance of machinery, equipment and tools included in the worksite facilities during the course of the work and the personnel supporting these facilities are also included.
- .4 This price includes, but is not limited to:
 - .1 Land
 - .1 Expenses for the acquisition, lease, compensation and use of land other than those which may be made available to the Contractor, either for the construction site or for temporary deposits.
 - .2 The costs of use and maintenance of the lands made available to the Contractor.
 - .2 Arrangements of Site Site Areas
 - .1 Land development required for development of site facilities.
 - .2 Site drainage.
 - .3 Site and personnel offices.
 - .4 Office of Parks Canada Representative.
 - .5 Premises for storage of equipment.
 - .6 External Storage for Equipment and Equipment.
 - .7 Barriers and fencing required throughout the duration of the work, including any movement and all temporary safety devices.
 - .8 The costs of guarding.

- .3 Machinery, Equipment and Tools
 - .1 All machinery and equipment required to maintain site operations including operation (eg for receiving and managing materials).
 - .2 Light trucks.
 - .3 Scaffolding.
 - .4 Generators and temporary lighting.
 - .5 tools.
 - .6 Compressors.
 - .7 Etc.
- .4 Networks
 - .1 Toilets on site.
 - .2 Water supply to existing site facilities from existing hydrants.
 - .3 Fire protection.
 - .4 Water for compaction of materials and dust suppressant.
 - .5 Power Supply.
 - .6 Lighting on site.
 - .7 Telephone and Internet links for use and use of Parks Canada Representative.
- .5 Health and Safety
 - .1 All equipment and supplies required to ensure health and safety in accordance with Section 01 35 29.06 of the Construction Specification and applicable laws and regulations.

- .6 Services
 - .1 This lump sum price includes the total remuneration including the salaries and bonuses of the contractor's site staff and clerical staff who will provide the services of site organization during the duration of the work, including but not limited to:
 - .2 Superintendency and project management.
 - .3 Topographic survey services.
 - .4 Studies of construction methods.
 - .5 Quality control.
 - .6 Health and Safety.
 - .7 Work planning and subcontractor management.
 - .8 Supply and Logistics.
 - .9 Preparation and management of documentation (in accordance with Section 01 33 00 of the construction specifications, including shop drawings, final plans, operating manuals and suppliers).
 - .10 Commissioning.
 - .11 Transportation, accommodation and subsistence costs of (indirect) support staff and all workers throughout the duration of the work.
- .7 Miscellaneous
 - .1 Licenses
 - .2 Supply and installation of 1220 mm x 2440 mm works identification sign, corresponding to a 3.0 m² for each worksite access.
 - .3 All other related costs for completion of work not included in unit and or lump sum prices.

- .4 Provision of timetable of work in two formats: (*.mpp & *.pdf) including all the updates and other information required.

.2 Electrical

.1 Lighting Units

- .1 For the price schedule's line item entitled "Lighting Units", the bidder shall list a price per unit that includes the supply and installation of each lamp. The price shall include, without being limited to:

- .1 Supplying and installing a street lamp including accessories such as the pole, footing, base cover, lug, etc.
- .2 Supplying, installing and wiring connections inside the lamp post, fuse holders, fuses, and splices.
- .3 Final adjustments to ensure pole verticality.
- .4 Connecting the street lamp to the circuit.
- .5 All other related works required to complete the work as specified in the plans and specifications.

- .2 Payment of this item will be made based on the progress of the work, as approved by Parks Canada Representative.

.2 Trenches Without Paving

- .1 For the price schedule's line item entitled "Trenches Without Paving", the bidder shall list a price per linear metre for the construction of trenches. The price shall include, without being limited to:

- .1 Retaining and protecting work areas.
- .2 Supporting and protecting public utilities.
- .3 Protecting trees, shrubs and fences.

- .4 Excavating and drying of trench, disposing of excavated materials and/or waste, encasing and backfilling.
 - .5 Compacting and installing signalling tape.
 - .6 Backfilling, final levelling and final adjustments.
 - .7 Site rehabilitation.
 - .8 All other related works required to complete the work as specified in the plans and specifications.
- .2 Payment of this item will be made based on the progress of the work, as approved by Parks Canada Representative.
- .3 Trenches Under Paving
- .1 For the price schedule's line item entitled "Trenches Under Paving", the bidder shall list a unit price per linear metre for the construction of trenches. The price shall include, without being limited to:
 - .1 Cutting the pavement, excavating, backfilling to infrastructure, and compacting (see details on plan) after the installation of ducts, signalling tape, removal of extra/unusable excavated material and all incidental expenses;
 - .2 All other related works required to complete the work as specified in the plans and specifications.
 - .2 Payment of this item will be made based on the progress of the work, as approved by Parks Canada Representative.
- .4 Concrete Bases
- .1 For the price schedule's line item entitled "Concrete Bases", the bidder shall list a unit price for the construction of concrete bases. The price shall include, without being limited to:
 - .1 Excavating.

- .2 Shoring trench, controlling water and supporting nearby structures.
 - .3 Preparing the bed.
 - .4 Constructing of the mound around the concrete base, if required.
 - .5 Supplying and installing the concrete bases, poured on site (including the anchor bolts, encased ducts and reinforcements) or the prefabricated base.
 - .6 Backfilling and compacting.
 - .7 Disposing of extra excavated material and/or waste.
 - .8 Final levelling and adjustments to the concrete base.
 - .9 All other related works required to complete the work as specified in the plans and specifications.
- .2 Payment of this item will be made based on the progress of the work, as approved by Parks Canada Representative.
- .5 PVC Ducts
- .1 For the price schedule's line item entitled "PVC Ducts", the bidder shall list a unit price per linear metre for supplying and installing PVC ducts, with ducts being measured parallel to the trench, from the centre of one concrete base to the centre of the next. The price shall include, without being limited to:
 - .1 Supplying and installing rigid PVC ducts with the diameter indicated on the schedule.
 - .2 Cleaning of the duct, passing a mandrel and stiff bristle brush, and installing a 6 mm nylon cable for pulling conductors or cables.
 - .3 All other related works required to complete the work as specified in the plans and specifications.
 - .2 Payment of this item will be made based on the progress of the work, as approved by Parks Canada Representative.

.6 Conductors

- .1 For the price schedule's line item entitled "Conductors", the bidder shall list a unit price per linear metre for supplying and installing conductors. The price shall include, without being limited to:
 - .1 Supplying and installing RWU-90 conductors in ducts, with caliber as indicated on plans.
 - .2 Measuring to be from one base centre to another.
 - .3 An additional 3 metres per rise for each cable in a concrete base.
 - .4 An additional 3.5 metres per rise for the power supply and distribution.
 - .5 An overall additional 4 metres for each cable passing through a pull block.
 - .6 An additional 1 metre for each cable passing through a pull box or junction box.
 - .7 All other related works required to complete the work as specified in the plans and specifications.
- .2 Payment of this item will be made based on the progress of the work, as approved by Parks Canada Representative.

.7 Ground-Level Pull Box

- .1 For the price schedule's line item entitled "Ground-Level Pull Box", the bidder shall list a unit price for supplying and installing pull boxes. The price shall include, without being limited to:
 - .1 Excavating.
 - .2 Supplying and installing the pull box duct.
 - .3 Backfilling.

- .4 All other related works required to complete the work as specified in the plans and specifications.
- .2 Payment of this item will be made based on the progress of the work, as approved by Parks Canada Representative.
- .8 Modification of Power Supply and Control Panel
 - .1 For the price schedule's line item entitled "Modification of Power Supply and Control Panel", the bidder shall list a lump-sum price for supplying and installing the equipment indicated on the plans and specifications. The price shall include, without being limited to:
 - .1 Supplying, installing and connecting all electrical equipment indicated on the plans and specifications.
 - .2 Installing, modifying and connecting the distribution components, breakers, contactors, terminal blocks, fuse holders, protective covers, astronomical timer, electric eye, selector switches, bushings and labelling stickers.
 - .3 Modifying the existing electrical distribution, connecting, relocating and pivoting of power supply and control panels.
 - .4 All other related works required to complete the work as specified in the plans and specifications.
 - .2 Payment of this item will be made based on the progress of the work, as approved by Parks Canada Representative.
- .9 Simple Street Lamp Disassembly
 - .1 For the price schedule's line item entitled "Simple Street Lamp Disassembly", the bidder shall list a unit price for dismantling simple street lamps. The price shall include, without being limited to:
 - .1 Disconnecting power conductors.

- .2 Removing the street lamp and dismantling it into its various parts (post, davit, light fixture).
 - .3 Removing conductors inside the post.
 - .4 Removing the various components (lamp, fuse holder, fuses).
 - .5 Storing the street lamp (post, davit, light fixture) at the location determined by Parks Canada.
 - .6 All other related works required to complete the work as specified in the plans and specifications.
- .2 Payment of this item will be made based on the progress of the work, as approved by Parks Canada Representative.
- .10 Concrete Base Dismantling
- .1 For the price schedule's line item entitled "Concrete Base Dismantling", the bidder shall list a unit price for dismantling concrete bases. The price shall include, without being limited to:
 - .1 Excavating.
 - .2 Sectioning ducts.
 - .3 Removing the concrete base and transporting it off site.
 - .4 Backfilling the hole resulting from its removal and compacting.
 - .5 All other related works required to complete the work as specified in the plans and specifications.
 - .2 Payment of this item will be made based on the progress of the work, as approved by Parks Canada Representative.

.11 Electrotechnical Testing

- .1 For the price schedule's line item entitled "Electrotechnical Testing", the bidder shall list a lump-sum price. The price shall include, without being limited to:
 - .1 Ensuring verifications are performed by an independent firm, as required in the specifications, including the necessary equipment.
 - .2 Issuing a report and performing additional inspections.
 - .3 All other related works required to complete the work as specified in the plans and specifications.
- .2 Payment of this item will be made based on the progress of the work, as approved by Parks Canada Representative.

.12 Anti-Theft Device

- .1 For the price schedule's line item entitled "Anti-Theft Device", the bidder shall list a unit price for installing an anti-theft device within lamp posts. The price shall include, without being limited to:
 - .1 Supplying and installing a steel plate and neoprene protection.
 - .2 Supplying and installing nuts and bolts.
 - .3 All other related works required to complete the work as specified in the plans and specifications.
- .2 Payment of this item will be made based on the progress of the work, as approved by Parks Canada Representative.

.13 Lighting Units and concrete bases:

- .1 For the price schedule's line item entitled "Lighting Units and concrete bases", the bidder shall list a price per unit that includes the supply and transportation of each lamp and concrete bases. The price shall include, without being limited to:

- .1 Supplying a street lamp including accessories such as the pole, footing, base cover, lug, etc.
- .2 Transportation of the concrete bases and the street lamp (post, davit, light fixture) at the location determined by Parks Canada.
- .2 Payment of this item will be made based on the progress of the work, as approved by Parks Canada Representative.

.3 Civil works

.1 Cycling path demolition

- .1 **This item is per square metre and includes all necessary measures, actions and supplies, including, but not limited to, management, labor, machinery and equipment, materials, surveys, licences, professional services and construction engineering for the supply of the following materials and works:**
 - .1 **Saw lines at locations indicated by Parks Canada representative**
 - .2 **Dismantling the existing cycling path at the locations indicated by Parks Canada representative by removing the asphalt in accordance with specifications including loading, transport and disposal in an authorized site**
 - .3 **Preparing the foundation soil by scarifying and excavating the granular material in accordance with the specification;**
 - .4 **The installation of topsoil to a thickness of 150mm, the finishing leveling and the disposition of the waste materials according to the requirements of the specification;**
 - .5 **Placing of the sod tiles according to the specification;**





- .6 **Cleaning in accordance with the requirements of the specification and any repair or reconstruction to complete the restoration work to the satisfaction of the Departmental Representative.**
- .2 **Payment of this item will be made based on the progress of the work, as approved by Parks Canada Representative.**
- .2 **Temporary cycling path construction**
 - .1 **This item is per square metre and includes all necessary measures, actions and supplies, including, but not limited to, management, labor, machinery and equipment, materials, surveys, licences, professional services and construction engineering for backfill work and asphalt paving of the temporary bicycle path construction at the locations shown on the plans or indicated by Parks Canada representative and according to the typical section shown in Annex A and to the specification and for the supply of the following materials and works :**
 - .2 **Excavation and backfill for the cycling path infrastructure. It is necessary to excavate and / or backfill to the level indicated on site by Parks Canada representative.**
 - .3 **Installation of the MG 20 granular foundation layer to a thickness of 150mm**
 - .4 **Installation of the MG 112 granular foundation layer to a thickness of 400mm**
 - .5 **Installation of asphalt EB-10C to a thickness of 50 mm**
 - .6 **Installation of pavement marking**
 - .7 **Cleaning in accordance with the requirements of the specification and any repair or reconstruction to complete the restoration work to the satisfaction of the Departmental Representative**

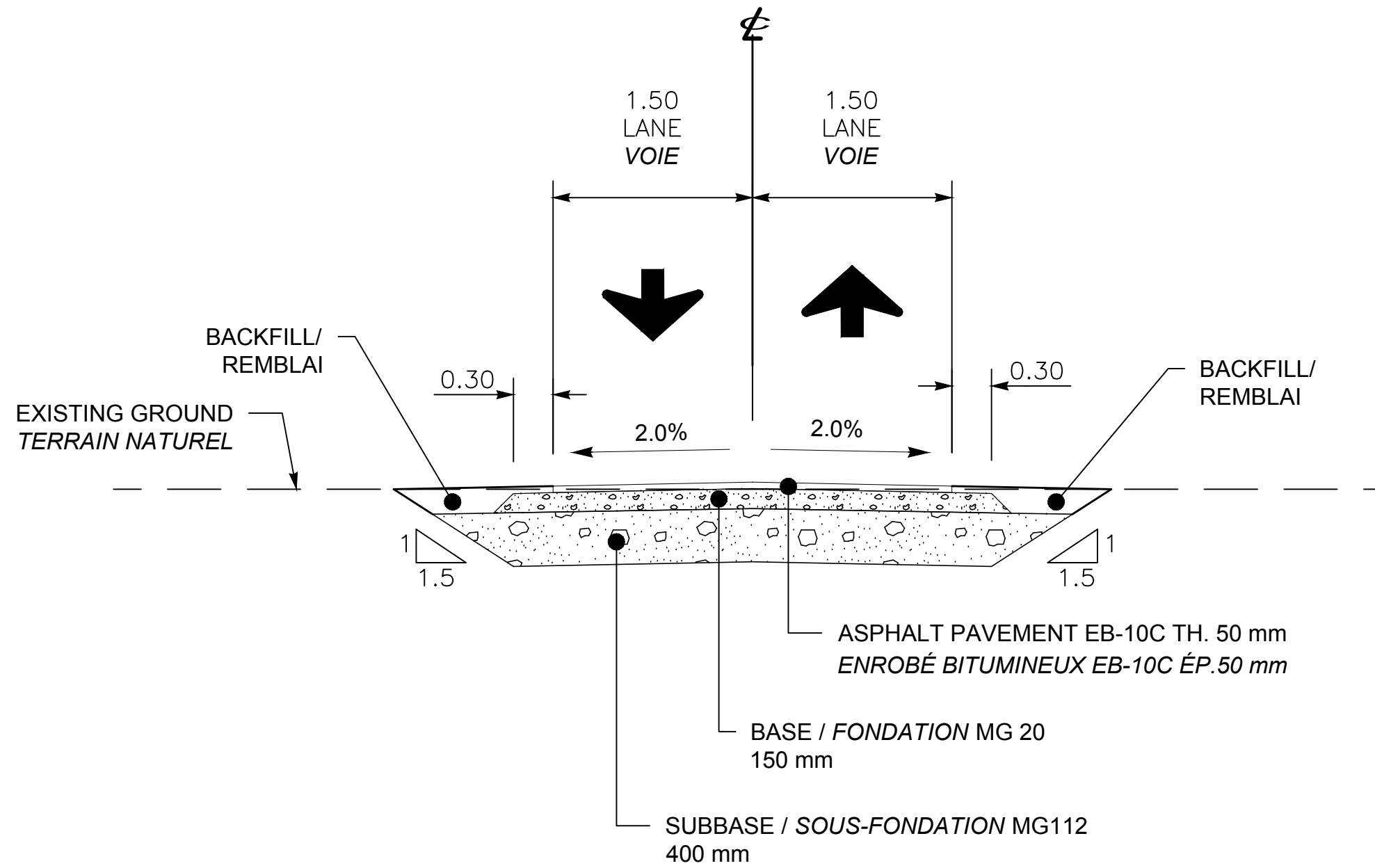
3. PRODUCTS

.1 Not Applicable.

4. EXECUTION

.1 Not Applicable.

PROPOSED CYCLING PATH DEVIATION
DÉVIATION PROPOSÉE DE LA PISTE CYCLABLE



TYPICAL CROSS SECTION - ANNEX A
COUPE TYPE PROPOSÉE - ANNEXE A
1:50



PART 1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 All sections of Divisions 01 - General Requirements and 02 - Existing Conditions
- .2 Section 31 23 33.01 – Excavating, Trenching and Backfilling.
- .3 Section 32 11 16.01 – Granular Sub-base
- .4 Section 32 11 23 – Aggregate Base
- .5 Section 32 12 16 –Asphalt Paving

1.2 REFERENCES

- .1 ASTM International
 - .1 ASTM D4791-10, Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate.

1.3 DOCUMENTS/SAMPLES TO SUBMIT FOR APPROVAL/INFORMATION

- .1 Submit in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for aggregate materials.
- .3 Samples:
 - .1 Submit one (1) sample per type of aggregate.
 - .2 Allow continual sampling by the Departmental Representative during production.
 - .3 Provide the Departmental Representative with access to source and processed material for sampling.
 - .4 Install sampling facilities at discharge end of production conveyor, to allow the Departmental Representative to obtain representative samples of items being produced. Stop conveyor belt when requested by the Departmental Representative to permit full cross section sampling.
 - .5 Provide front end loader or other suitable equipment including trained operator for stockpile sampling as necessary. Move samples to storage place as directed by the Departmental Representative.
 - .6 Supply new or clean sample bags or containers according appropriate to aggregate materials.
 - .7 Pay cost of sampling and testing of aggregates which fail to meet specified requirements.
 - .8 Provide water, electric power and propane to the Departmental Representative laboratory trailer at production site.



1.4 TRANSPORTATION, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements.
- .2 Transportation and Handling: handle and transport aggregates to avoid segregation, contamination and degradation.
- .3 Storage: store washed materials or materials excavated from underwater 24 hours minimum to allow free water to drain and for materials to attain uniform water content.

PART 2 PRODUCTS

2.1 MATERIALS

- .1 Aggregate quality: sound, hard, durable material free from soft, thin, elongated or laminated particles, organic material, clay lumps or minerals, free from adherent coatings and injurious amounts of disintegrated pieces or other deleterious substances.
- .2 Flat and elongated particles of coarse aggregate: to ASTM D4791.
 - .1 Greatest dimension to exceed 5 times least dimension.
- .3 Fine aggregates satisfying requirements of applicable section to be one, or blend of following:
 - .1 Screenings produced in crushing of quarried rock, boulders, gravel or slag.
 - .2 Reclaimed asphalt pavement.
 - .3 Reclaimed concrete material.
- .4 Coarse aggregates satisfying requirements of applicable section to be one of or blend of following:
 - .1 Crushed rock.
 - .2 Gravel and crushed gravel composed of naturally formed particles of stone.
 - .3 Light weight aggregate, including slag and expanded shale.
 - .4 Reclaimed asphalt pavement.
 - .5 Reclaimed concrete material.

2.2 SOURCE QUALITY CONTROL

- .1 Inform the Departmental Representative of the source of the materials for the aggregates and allow him access to that source for sampling purposes at least four (4) weeks prior to production.
- .2 If materials from proposed source do not meet, or cannot reasonably be processed to meet, specified requirements, locate alternative source.
- .3 Advise the Departmental Representative four (4) weeks minimum in advance of proposed change of material source.
- .4 Acceptance of material at source does not preclude future rejection if it fails to conform to requirements specified, lacks uniformity, or if its field performance is found to be unsatisfactory.



PART 3 EXECUTION

3.1 NOT USED

- .1 Not used.

END OF SECTION



PART 1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 All sections of Divisions 01 - General Requirements and 02 - Existing Conditions
- .2 Section 31 05 16- Aggregate materials
- .3 All sections of Division 32 – Exterior Improvements

1.2 REFERENCES

- .1 Always reference the most recent edition of the reference standards.
- .2 American Society for Testing and Materials International (ASTM)
 - .1 ASTM C117-03, Standard Test Method for Material Finer than 0.075 mm (No.200) Sieve in Mineral Aggregates by Washing.
 - .2 ASTM C136-06, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
 - .3 ASTM D422-63 2002, Standard Test Method for Particle-Size Analysis of Soils.
 - .4 ASTM D698-12e2, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³) (600 kN-m/m³).
 - .5 ASTM D1557-12e1, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³) (2,700 kN-m/m³).
 - .6 ASTM D4318 – 10e1, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
- .3 Canadian General Standards Bureau (CGSB)
 - .1 CAN/CGSB-8.1, Sieves, Testing, Woven Wire, Inch Series
 - .2 CAN/CGSB-8.2, Sieves, Testing, Woven Wire, Metric
- .4 U.S. Environmental Protection Departmental (EPA)/Office of Water
 - .1 EPA 832R92005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.
- .5 MDDEP - Procedures for discharging wastewater into a watercourse

1.3 DEFINITIONS

- .1 Excavation classes: two classes of excavation will be recognized; common excavation and rock excavation.
 - .1 Rock: no rock excavation is planned.. However, blocks of more than 1 cubic meter could be encountered during excavation behind the existing wall to be repaired.
 - .2 Common excavation: excavation of materials of whatever nature, which are not included under definitions of rock excavation.
- .2 Unclassified excavation: excavation of deposits of whatever character encountered in Work.



- .3 Top soils.
 - .1 Any material suitable for plant growth and suitable for use as top soil, which can be used for landscaping or seeding.
 - .2 Any material that is reasonably free of subsurface material, clay clumps, brush, weeds and other debris, and free from rocks, stumps, roots and other harmful materials of 25 mm
- .4 Waste material: excavated material unsuitable for use in Work or surplus to requirements.
- .5 Borrow material: material obtained from locations outside area to be graded, and required for construction of fill areas or for other portions of Work.
- .6 Recycled backfill material: material considered neutral, from various sources and modified to respond to the needs of the fill area.
- .7 Unsuitable materials:
 - .1 Weak, chemically unstable, and compressible materials.
 - .2 Frost susceptible materials:
 - .1 Fine grained soils with plasticity index less than 10 when tested to ASTM D4318, and gradation within limits specified when tested to ASTM D422 and ASTM C136 : Sieve sizes to CAN/CGSB-8.2.
 - .2 Table:

Sieve Designation	% Passing
2.00 mm	100
0.10 mm	45 - 100
0.02 mm	10 - 80
0.005 mm	0 - 45
 - .3 Coarse grained soils containing more than 20 % by mass passing 0.075 mm sieve.
- .8 Unshrinkable fill: very weak mixture of cement, concrete aggregates and water that resists settlement when placed in utility trenches, and capable of being readily excavated.
- .9 The density of the backfill material installed shall be measured in relation to the maximum dry density determined in the modified Proctor test in accordance with the provisions of ASTM D1557-78

1.4 RECYCLED, RECOVERED OR REUSED MATERIALS

- .1 In the context of this project, given the large volume of concrete to be deconstructed and for the sake of sustainable development, the Contractor will be able to consider in his options, if he so requests, re-using certain materials for backfilling of excavations. For example, residues from concrete grinding could be reused for backfilling under certain conditions, but not limited to.
- .2 Such materials may be re-used if and only if the backfill material is accompanied by a certificate of conformity under the most current edition of BNQ 2560-600 - Standard for Identification and Use of recycled materials containing bituminous mix and cement concrete residues
- .3 In addition, materials may be reused if and only if they comply with all applicable laws and regulations in force, including the Environmental Quality Act.





- .4 All materials which the Contractor wishes to reuse or which are potentially recyclable must be previously characterized according to the requirements of BNQ 2560-600 - Recycled Materials Identification and Use Containing residues of bituminous mixtures and cement concrete
- .5 All certificates of conformity of such materials shall be submitted to the Departmental Representative for pre-approval.

1.5 LINES AND LEVELS OF BENCHMARK, IMPLANTATION

- .1 Place all required benchmarks at the work site in order to accurately delineate the excavations to be completed and the embankments to be constructed in plan and elevation.
- .2 The Contractor shall establish, at his own expense, the profiles and alignments necessary to carry out the work from the benchmarks shown on the plans or as indicated by the Departmental Representative.
- .3 The Contractor is responsible for the installation of the works. If there is insufficient information on the plans to locate the works, ask the Departmental Representative for the benchmarks to be used.
- .4 Concrete structures shall be laid out at all times and throughout the period of implantation of new underground and aboveground infrastructures, the Contractor's surveyor must be present at the site Operations using simple and verifiable methods on site and in such a way that the Departmental Representative can validate the work, and accuracy of dimensions, levels and other markers using a tape measure.
- .5 Provide required equipment, such as rules and templates, to facilitate the work of the Departmental Representative in the inspection of the work.

1.6 PROTECTION OF EXISTING WORKS

- .1 Underground utilities and networks:
 - .3 Before commencing excavation and trenching work, notify the Departmental Representative and the authorities of the utility companies concerned and determine the location and condition of the underground works and networks. Clearly identify locations to avoid interruption of service during job completion.
 - .4 Confirm location of underground systems by thoroughly performing test excavations. In the event of a breakage caused by the work, repair it promptly and as directed by the Departmental Representative.
 - .5 Maintain and protect water, sewer, gas, electricity, telephone and other networks or structures from damage. Assume the cost of this work.
 - .6 Obtain appropriate instructions from the Departmental Representative prior to moving or removing a utility line or work identified in the excavation area.
 - .7 Take note of the location of the underground pipes conserved, diverted or abandoned.
- .2 Works on the Surface
 - .1 In the presence of the Departmental Representative, verify the condition of trees and other plants, lawns, fences, utility poles, cables, railway tracks, roadways, and boundary markers susceptible of being damaged during the work.



- .2 During construction, protect from damage all existing buildings and structures that may be damaged. If necessary, carry out repairs to the satisfaction of the Departmental Representative.
 - .3 If excavation work is required to cut roots or branches, perform this work as prescribed by the Departmental Representative.
 - .4 If it appears that the work may constitute a hazard to existing buildings or adjacent works and services, stop them and notify the Departmental Representative. Properly support the works and resume work only after obtaining the authorization of the Departmental Representative.
 - .5 If the Departmental Representative deems it necessary, install reinforcement and shoring parts and carry out the necessary work to prevent any displacement or subsidence of the works. Failure to comply with this order without notice shall be carried out by the Departmental Representative at the expense of the Contractor.
 - .6 Take responsibility for damages caused by weather, negligence, lack of coordination or precaution.
- .3 Refer to and comply with all other requirements of the notes to the plans.

1.7 SUBMITTAL PROCEDURES

- .1 Quality Control
 - .1 Submit documents and samples as required according to section 01 33 00 – Submittal procedures.
 - .2 Submit condition survey of existing conditions if requested by the Departmental Representative.
 - .3 Submit for review by the Departmental Representative proposed dewatering methods.
 - .4 Submit to the Departmental Representative written notice at least 7 days prior to excavation work, to ensure cross sections are taken.
 - .5 Submit to the Departmental Representative written notice when bottom of excavation is reached.
 - .6 Submit to the Departmental Representative results, testing, report and inspection.
- .2 Preconstruction Submittals:
 - .1 Submit construction equipment list for major equipment to be used in this section prior to start of Work.
 - .2 Submit files concerning the location of underground utility networks, which include location drawings of existing utilities on the grounds.
- .3 Samples
 - .1 Submit required samples as needed.
 - .2 At least 4 weeks prior to commencement of work, the General Contractor shall notify the Departmental Representative and the laboratory of the source of supply to which the Contractor intends to acquire the backfill materials and allow him access For sampling purposes.



1.8 QUALITY ASSURANCE

- .1 Retain the services of a professional engineer registered or licensed in Canada, in the province of Quebec to undertake the design and inspection shoring works, bracing and recovery in work used during the performance of work

1.9 WASTE MANAGEMENT AND DISPOSAL

- .1 Divert excess aggregate materials or excavation materials from landfill to local quarry or recycling facility for reuse as directed by the Departmental Representative , if applicable

1.10 EXISTING CONDITIONS

- .1 Buried services:
 - .1 Before commencing Work, verify and establish location of buried services on and adjacent to site, and notify the Departmental Representative.
 - .2 Confirm locations of buried utilities by careful test excavations.
 - .3 Maintain and protect from damage, water, sewer, gas, electric, telephone and other utilities and structures encountered.
 - .4 Arrange with the Departmental Representative for relocation of buried services that interfere with execution of Work.
 - .5 Remove obsolete buried services within 2 m of foundations, and cap cut-offs.
 - .6 Record location of maintained, re-routed and abandoned underground lines.
 - .7 Size, depth and location of existing utilities and structures as indicated are for guidance only. Completeness and accuracy are not guaranteed.
- .2 surface features
 - .1 Conduct, with the Departmental Representative, condition survey of existing features, trees and other plants, lawns, fencing, service poles, wires, rail tracks, pavement, survey bench marks and monuments which may be affected by Work.
 - .2 Protect existing surface features from damage while Work is in progress. In event of damage, immediately make repair as directed by the Departmental Representative.
- .3 Presence of Rock
 - .3 The Contractor shall consider the possible presence of deep rock on the canal side.

PART 2 PRODUCTS

2.1 MATERIALS

- .1 Fill MG 20 :
 - .1 Granular foundation materials shall comply with the requirements of 31 05 16 "Aggregates".
 - .2 Crushed stone or gravel consisting of hard, resistant, angular particles free from clay, hydraulic, organic or frozen materials and any other deleterious substances.



.3 The physical and mechanical properties of aggregates of the lower and upper granular foundation shall meet the following requirements:

.1 Table of Requirements

Trials

BNQ Standards	Sub-fondation
Maximum petrographic number	200
Durability MGS04 - maximum	20
Los Angeles – maximum percentage	50
Micro-Deval – maximum percentage	33
Fragmentation – minimum percentage	100
Organic matter – maximum percentage	0.8

.2 Los Angeles: "Aggregates, determination of abrasion resistance using the Los Angeles device", the maximum is 32 instead of 50 in the case of crushed limestone.

.3 Fragmentation: the percentage indicated is the percentage by mass of fragmented particles having at least one face fractured by crushing and retained on the 5 mm sieve.

.4 Organic matter; The test standard LC31-228.

.5 Materials shall not contain more than 3.5% particle size finer than 0.02 mm.

.6 In the tests carried out in accordance with ASTM C136-82 and ASTM C117-80, the particle size of the compacted materials shall remain within the following limits and the particle size curve plotted on a semi-logarithmic diagram shall be continuous and unbroken

Sieve	% passage
31,5 mm	100
20 mm	90-100
14 mm	68-93
5 mm	35-60
1,25 mm	14-38
0,315 mm	9-17
0, 080 mm	2-7

.2 Fill MG-112 :

.1 Borrow material MG-112 shall meet the following requirements and requirements: Stone, gravel or sand crushed, quarry-run or sifted;

.2 The particle size of the material after compaction shall remain within the following limits and the granulometric curve drawn on a semi-logarithmic diagram shall be continuous and not broken:





Sieve	% passage
112 mm	100
20 mm	50-100
5,0 mm	12-70
0,080 mm	0-10

.4 The physical and mechanical properties of aggregates of the granular sub-base shall meet the following requirements:

.1 Table of requirements

Trials

BNQ Standards	Sub-fondation
Maximum petrographic number :	200
Durability MGSO4 – maximum percentage :	20
Los Angeles – maximum percentage :	50
Micro-Deval – maximum percentage :	35
Fragmentation – minimum percentage :	60
Organic material – maximum percentage :	0.8
Value to blue – maximum percentage	0.2

.2 Los Angeles: "Aggregates, determination of abrasion resistance using the Los Angeles appliance", the maximum is 32 instead of 50 in the case of crushed limestone.

.3 Fragmentation: the percentage indicated is the percentage by mass of fragmented particles having at least one face fractured by crushing and retained on the 5 mm sieve.

.4 Organic matter; The test standard LC31-228.

.3 Fill classe B Material approved by Departmental Representative from excavation or other sources, and free from roots, rocks larger than 75 mm in diameter, construction debris, ashes, cinders, sods, topsoil, of organic matter, refuse or other deleterious materials.

.4 Non-shrinkage fill or dimensionally stabilized backfill material:

.1 maximum compressive strength of 0.4 MPa at 28 days;

.2 maximum Portland cement content of 25 kg / m³, consisting of 40% fly ash as replacement material: according to CAN / CSA-A3000 Type GU;

.3 minimum resistance of 0.07 MPa to 24 hours;

.4 concrete aggregates: according to CAN / CSA-A23.1 / A23.2-04;

.5 Portland cement: GU type;

.6 slump: 160 to 200 mm.

.5 Borrow quarry pit run.

.6 20 mm crushed stone : Crushed stone from quarries of caliber 20mm .





- .7 All aggregates in accordance with "31 05 16 – Aggregate Materials".

PART 3 EXECUTION

3.1 MEANS OF SEDIMENT EROSION CONTROL

- .1 Establish temporary means to control erosion and sediment deposition to prevent soil loss from storm water runoff or wind erosion and to drive soil to watercourses. These means shall comply with the requirements of applicable codes, standards and regulations.
- .2 Inspect and maintain maintenance and repair if necessary, until permanent vegetation is established.
- .3 Remove control and timely remediation and stabilize surfaces disturbed during construction.

3.2 PREPARATION WORK

- .1 Remove obstructions, ice and snow, from surfaces to be excavated within limits indicated.
- .2 Cut pavement or sidewalk neatly along limits of proposed excavation in order that surface may break evenly and cleanly.
- .3 Obtain all necessary permits for operations, including but not limited to the disposal of waste by burning or other method.

3.3 PREPARATION/PROTECTION

- .1 Protect existing features.
- .2 Keep excavations clean, free of standing water, and loose soil.
- .3 Where soil is subject to significant volume change due to change in moisture content, cover and protect to the Departmental Representative's satisfaction.
- .4 Protect natural and man-made features required to remain undisturbed.
- .5 Protect buried services that are required to remain undisturbed.

3.4 STOCKPILING

- .1 Stockpile fill materials in areas designated by the Departmental Representative.
- .2 Stockpile granular materials in manner to prevent segregation.
- .3 Protect fill materials from contamination.
- .4 Implement sufficient erosion and sediment control measures to prevent sediment release off construction boundaries and into water bodies.

3.5 DEWATERING OF EXCAVATIONS AND HEAVE PREVENTION

- .1 Where appropriate, clear snow from work site and transport snow from site.
- .2 Submit to the Departmental Representative for his review, the details of the proposed dewatering methods of excavations and heave prevention,



- .3 Retain the services of a qualified professional engineer recognized in the Province of Quebec for the design of the system for the lowering of the water table and the drainage of excavations.
- .4 The Contractor shall be responsible for the costs of designing and constructing the excavation system and the lowering of the water table.
- .5 Protect open excavations against flooding and damage due to surface run-off
- .6 The Contractor shall consider that potential groundwater infiltration may occur during excavation work, especially during the shipping season.
- .7 Dispose of water in accordance with Section 01 35 43 - Environmental Procedures collection runoff areas and in manner not detrimental to public and private property, or portion of Work completed or under construction.
 - .1 Provide and maintain temporary drainage ditches and other diversions outside of excavation limits.
- .8 Regardless of the type of drainage (gravity or pumped), the collected water cannot be discharged to municipal, provincial and/or existing watercourses or wetlands without installation and adequate treatment for the reduction of contaminants below the levels permitted by municipal and provincial regulations. In the event of a rejection to the city's and or the Quebec Ministry of Transport's networks, the Contractor must obtain an official permit from the Competent Authority in this matter and provide a copy to the Departmental Representative.

3.6 EXCAVATION

- .1 It is understood that no special compensation will be paid to the Contractor for the use of equipment necessary to break and excavate the rock, , where appropriate and even if the nature of the work so requires. Also, no special compensation will be paid to the Contractor for excavation in moving sand, hardpan, silt layers or thin strata of pebbles agglomerated with clay, In broken or loose shale, in cemented gravel or in any other material that may be encountered, such as for the extraction of large pebbles, frozen earth, etc.
- .2 It is understood that no special compensation will be paid to the Contractor for snow removal work when required.
- .3 Advise the Departmental Representative at least 7 days in advance of excavation operations for initial cross sections to be taken.
- .4 Remove any other obstructions on site during the excavation work
- .5 Excavation must not interfere with bearing capacity of adjacent foundations.
- .6 Cut and deposited material shall be deposited at a sufficient distance from the top of the existing wall in relation to the sections not previously excavated, as specified by the Departmental Representative.
- .7 Dispose of improper or surplus cut off site at designated location by Departmental Representative. In the case of dry materials (paving, concrete, pipes, stumps, trees, shrubs, etc.), follow the descriptions in the Solid Waste Regulations (Q-2, r.14) and other municipal or local by-laws which may apply.
- .8 Avoid obstructions to runoff or natural waterways. Ensure that rainwater, snowmelt, groundwater, sewage and water from any other source are inspected and evacuated at the site to enable the work to be carried out.



- .9 Earth bottoms of excavations to be undisturbed soil, level, free from loose, soft or organic matter.
- .10 Notify the Departmental Representative when bottom of excavation is reached.
- .11 Obtain the Departmental Representative's approval of completed excavation.
- .12 Remove unsuitable material from trench bottom including those that extend below required elevations to extent and depth as directed the Departmental Representative.
- .13 Profile excavations by hand, strengthen the walls and remove all non-adherent materials and debris found there.
- .14 If the materials of the excavation base were bothered, compact them to a density at least equal to that of the undisturbed soil.
- .15 Excavate and transport off-site disused utility networks buried in the ground, as well as debris from old foundations, decommissioned cofferdams, concrete blocks, railway track rails, reservoirs, etc. existing in the soil.
- .16 Take precautions to remove dust generated.
- .17 Where applicable install geotextiles according to manufacturer's requirements.
- .18 Comply with the Departmental Representative specific requirements for archaeological monitoring. In the case where archaeological surveillance is not required for the works and an archaeological vestige (vestige of construction or development, object and fragment of object) is discovered accidentally during the excavations, The contractor shall suspend work in the immediate area of the discovery and notify the Departmental Representative, who will then take the necessary steps to protect and conserve the said archaeological remains. Meanwhile, work must continue in another area.

3.7 FILL MATERIAL AND COMPACTION

- .1 Use fill material of the type indicated or prescribed in the drawings. The densities obtained by compacting are percentages of maximum densities calculated according to ASTM D1557.

3.8 ENVIRONMENTAL PROTECTION MEASURES

- .1 The purpose of protection measures is to control and contain sediments within the site, protect slopes and deposits in heaps from erosion, promote natural water infiltration and Control runoff during and after construction.
- .2 Protective measures against aerial and hydraulic erosion
 - .1 Site surfaces shall be covered with a stable material such as grass, gravel, or geotextile membrane.
 - .2 Keep bulk material, such as sand, earth, gravel or other materials, to a minimum. Materials placed in heaps greater than 2.0 m in height must be protected against erosion by means of canvas or membranes.
 - .3 In dry weather, water the ground to create a dust suppressant.



- .3 Protective measures against sediment discharge into the drainage system or the environment
 - .1 Provide sloping surfaces to the interior of the site to prevent runoff from washing material outside of the site.
 - .2 Provide 20-56 mm clear stone running surfaces to help clean vehicle wheels and construction machinery.
 - .3 Establish sediment barriers to protect surrounding areas.
 - .4 Waste water from site must be pre-filtered.
 - .5 If necessary, clean the surrounding streets with a mechanical brush.
- .4 Maintenance Activities
 - .1 Periodically inspect and clean after each period of rain or snow.
 - .2 Maintain entrances in good condition to prevent sediment traces or deposits on public roads. On the running surfaces, add or replace the 20-56 mm net stone according to the site conditions.
 - .3 Clean sediment fallen or left on public roads.

3.9 BACKFILLING

- .1 Where applicable, all materials must be from sites authorized under the Quarrying and Sand Pits Regulations.
- .2 Do not proceed with backfilling operations until completion of following:
 - .1 Departmental Representative has inspected and approved installations.
 - .2 Departmental Representative has inspected and approved of construction below finish grade.
 - .3 Inspection, testing, approval, and recording location of underground utilities.
 - .4 backfilling of voids with acceptable soil
- .3 Areas to be backfilled to be free from debris, snow, ice, water and frozen ground.
- .4 Do not use backfill material which is frozen or contains ice, snow or debris unless authorized by the Departmental Representative.
- .5 Proceed to filling with quarry run material avoiding impose undue pushed to the piles Proceed by spreading relatively uniform layers not exceeding one and a half times the maximum size of the biggest elements, to avoid any violent impact that could damage the works
- .6 Apply the fill material in uniform layers not exceeding 150 mm compacted thickness up to specified levels. Compact each layer as indicated on the drawings.
- .7 Following mass excavation, embankment under pavement structures, under the structure of the new multipurpose trail shall be done using the granular materials as shown on the drawings, placed in layers of 150 to 300 mm maximum. The material shall be compacted to a minimum dry density of 90% of the modified Proctor's maximum value unless otherwise stated, under pavement structures and a minimum dry density of 95% of the modified Proctor's maximum value, unless otherwise stated, under the concrete structures. The Contractor must refer to the plans for the specifications of the required structures and infrastructure



**3.10 RESTORATION**

- .1 Upon completion of work, remove waste materials and debris as described in Section 01 74 21 - Construction / Demolition Waste Management and Disposal, smooth slopes and correct defects as directed by the Departmental Representative .
- .2 Replace topsoil as instructed by Departmental Representative.
- .3 Return pavement and deck surfaces affected by work to condition and levels prior to start of work, taking care to respect original thickness of work.
- .4 Clean and rehabilitate areas affected by work as instructed by Departmental Representative.
- .5 Protect newly graded areas from traffic and erosion and maintain free of trash or debris.



PART 1 GENERAL

1.1 RELATED REQUIREMENT

- .1 All sections of Divisions 01 - General Requirements and 02 - Existing Conditions
- .2 Section 31 05 16 –Aggregate Materials
- .3 Section 31 23 33.01 –Excavation, Trenching and Backfilling
- .4 All sections of Division 32 – Exterior Improvements

1.2 REFERENCES

- .1 American Society for Testing and Materials (ASTM)
 - .1 ASTM C117-13, Standard Test Methods for Material Finer Than 0.075 (No 200) mm Sieve in Mineral Aggregates by Washing.
 - .2 ASTM C131-14, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
 - .3 ASTM C136-14, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
 - .4 ASTM D422-63(2007)e2, Standard Test Method for Particle-Size Analysis of Soils.
 - .5 ASTM D698-12e2, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400ft-lbf/ft³) (600kN-m/m³).
 - .6 ASTM D1557-16, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000ft-lbf/ft³) (2,700kN-m/m³).
 - .7 ASTM D1883-16, Standard Test Method for CBR (California Bearing Ratio) of Laboratory Compacted Soils.
 - .8 ASTM D4318-10e1, Standard Test Methods for Liquid Limit, Plastic Limit and Plasticity Index of Soils.
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN/CGSB-8.1-88, Sieves, Testing, Woven Wire, Inch Series.
 - .2 CAN/CGSB-8.2-M88, Sieves, Testing, Woven Wire, Metric.

1.3 TRANSPORTATION, STORAGE AND HANDLING

- .1 Transport, store and handle materials and equipment according to section 01 61 00 –Common Product Requirements.



PART 2 PRODUCTS

2.1 MATERIALS

- .1 Granular foundation materials shall comply with the following requirements.
 - .1 Crushed stone or gravel consisting of hard, resistant, angular particles free of clumps, hydraulic, organic or frozen materials, and any other deleterious substances
 - .2 The physical and mechanical properties of aggregates of the lower and upper granular foundation shall meet the following requirements:
 - .1 Table of requirements
 - .2 Testing

BNQ Standards	Sub-base
Petrographic number -maximum	200
Durability MgSO ₄ -maximum percentage	25
Los Angeles – maximum percentage	50
Micro-Deval – maximum percentage	36
Fragmentation – maximum percentage	60
Organic materials – maximum percentage	0,8

- .3 Los Angeles: "Aggregates determination of the abrasion resistance using the apparatus Los Angeles", the maximum is 32 instead of 50 in the case of crushed rocks limestone".
- .4 Fragmentation: the percentage shown is the percentage by weight of the comminuted particles having at least one face fractured by crushing and retained on the sieve of 5 mm.
- .5 Organic matter: LC-31-228 test standard.
- .3 Materials shall not contain more than 3.5% of particles finer than 0.02 mm.
- .4 Liquidity limit: in accordance with ASTM D4318-84, maximum 25.
- .5 Plasticity index: according to ASTM D4318-84, maximum 6.

2.2 GRANULAR FOUNDATION

- .1 In the tests carried out in accordance with ASTM C136 and ASTM C117, the particle size of the compacted materials shall remain within the following limits and the particle size curve drawn on a semi-logarithmic diagram shall be continuous and not broken.

Sieve	% passing	
	MG56	MG20
80 mm	100	100
56 mm	82-100	100
31,5 mm	50-80	100
20 mm	s.o.	90-100
14 mm	s.o.	68-93
5 mm	25-50	35-60



Sieve	% passing	
	MG56	MG20
1,25 mm	s.o.	14-38
0,315 mm	4-18	9-17
0,080 mm	2-7	2-7

PART 3 EXECUTION

3.1 EXECUTING THE WORK

- .1 Install foundation base layer materials once sub-base layer is inspected and approved by Departmental Representative.
 - .1 Implementation
 - .1 Make the granular base layer at the specified depth and level.
 - .2 Ensure no frozen material is placed.
 - .3 Place material only on clean unfrozen surface, free from snow or ice.
 - .4 Install granular materials using methods that prevent segregation and degradation.
 - .5 Spread material to full width in uniform layers not exceeding 200 mm compacted thickness. The Departmental Representative may authorize thicker lifts if specified compaction can be achieved.
 - .6 Shape each layer to smooth contour and compact to specified density before succeeding layer is placed.
 - .7 Remove and replace portion of layer in which material has become segregated during spreading.
 - .2 Compaction Equipment
 - .1 Compaction equipment shall be capable of rendering the materials to the density required for the present work.
 - .3 Compaction
 - .1 Compact to density of not less than 98% maximum modified Proctor.
 - .2 Profile and alternately roll the materials in place to obtain a uniform, even and evenly compacted base layer
 - .3 Apply water as necessary during compaction to obtain specified density. If the soil is too humid, dry it by scarifying with appropriate equipment until the water content returns to normal.
 - .4 In areas facing existing dikes, dynamic compaction may only be carried out after receipt of written authorization from the Departmental Representative.

**3.2 TOLERANCES**

- .1 The allowable variance for the finished foundation layer is 10 mm more or less than the prescribed cross-sectional area and profile; This gap, whether more or less, cannot be uniform over the entire surface of the foundation layer.

3.3 PROTECTION

- .1 Maintain finished foundation in accordance with requirements of this section until completion of work receipt by Departmental Representative.

**PART 1 GENERAL****1.1 RELATED REQUIREMENTS**

- .1 All sections of Divisions 01 - General Requirements and 02 - Existing Conditions
- .2 Section 31 05 16 –Aggregate Materials
- .3 Section 31 23 33.01 –Excavation, trenching and Backfilling
- .4 Section 32 11 16.01 – Granular Sub-Base

1.2 REFERENCES

- .1 American Society for Testing and Materials (ASTM)
 - .1 ASTM C117-13, Standard Test Methods for Material Finer Than 0.075 (No 200) mm Sieve in Mineral Aggregates by Washing
 - .2 ASTM C131-14, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
 - .3 ASTM C136-14, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
 - .4 ASTM D422-63(2007)e2, Standard Test Method for Particle-Size Analysis of Soils
 - .5 ASTM D698-12e2, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³) (600 kN-m/m³)
 - .6 ASTM D1557-12e2, Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³) (2,700 kN-m/m³)
 - .7 ASTM D1883-16, Standard Test Method for CBR (California Bearing Ratio) of Laboratory Compacted Soils
 - .8 ASTM D4318-10e1, Standard Test Methods for Liquid Limit, Plastic Limit and Plasticity Index of Soils
- .2 Canadian General Standards Board (CGSB)
 - .1 CAN / CGSB 8.1 88, Wire mesh screen, nonmetric
 - .2 CAN / CGSB 8.2 M88, Metal wire mesh screen, metric

1.3 TRANSPORT, ENTREPOSAGE ET MANUTENTION

- .1 Transport, store and handle the materials and equipment according to section 01 61 00 – Common Product Requirements



PART 2 PRODUCTS

2.1 MATERIALS

- .1 Stone, gravel or sifted crushed or quarry-run sands conforming to the requirements of section 31 05 16 - Aggregates.
- .2 Granular sub-base materials shall comply with the following requirements:
 - .1 The particle size after compaction of the materials used shall remain within the following limits and the grain size curve drawn on a semi-logarithmic diagram shall be continuous and not broken:

Sieve	% passing
112 mm	100
20mm	50-100
5,0 mm	12 - 100
0,080 mm	0 – 10

- .2 Liquidity limits: maximum 25, in accordance with ASTM D4318.
- .3 Plasticity index: maximum 6, according to ASTM D4318
- .4 Materials shall not contain more than 3% finer particles than the 20 µm sieve according to ASTM D422
- .5 Physical and mechanical properties shall meet the following requirements:
 - .1 Table of Requirements
 - .2 Tests

BNQ Standards	Sub-fondation MG 112
Maximum petrographic number	200
Durability MgSO ₄ – maximum percentage	25
Los Angeles –maximum percentage	50
Micro-Deval – maximum percentage	36
Fragmentation – minimum percentage	60
Organic matter – maximum percentage	0,8

- .3 Los Angeles: “Granulates –Determination of the abrasion resistance using the Los Angeles device,” maximum 32 instead of 50 in case of limestone crushed stone.
- .4 Degradation: percentage indicated is percent by mass of fragmented particles having at least one face fractured by crushing and retained on 5 mm sieve.
- .5 Organic matter: to testing standard LC31-228.

PART 3 EXECUTION

3.1 PLACING OF MATERIALS

- .1 Place granular base after sub-base is inspected and approved by the Departmental Representative.



- .2 Place embankment materials along the backfill structure once approved by the Departmental Representative.
- .3 Ensure no frozen material is used.
- .4 Place material only on clean unfrozen surface, free from snow and ice.
- .5 Place material using methods which do not lead to segregation or degradation.
- .6 Spread materials across width of work to be achieved, in uniform layers up to 300 mm thick after compaction. The Representative of the Ministry may permit the placing of thicker layers if specified compaction can be achieved.
- .7 Shape each layer to smooth contour and compact to specified density before succeeding layer is placed.
- .8 Remove and replace portion of layer in which material has become segregated during spreading.

3.2 COMPACTION

- .1 Compaction equipment must be capable of obtaining materials having the density required for the present work.
- .2 Compaction equipment shall be equipped with a device which records in hours the actual duration of compaction work and not the number of hours of operation of the engine.
- .3 Compact up to at least 90% of maximum corrected dry bulk density.
- .4 Compact up to at least 95% of maximum dry bulk density corrected for last 150 mm.
- .5 Roll out and compact alternately to obtain a uniform, even and evenly compacted sub-base layer.
- .6 Add, during compaction, the water required to achieve the prescribed density. If the soil is too wet, air it by scarifying it with the appropriate equipment until the water content returns to normal.
- .7 Where compacting equipment, also known as rolling stock, cannot be used, compact the materials to the prescribed density using mechanical compaction plates approved by the Departmental Representative.
- .8 In areas facing existing dykes, dynamic compaction may be carried out only after written authorization has been received from the Departmental Representative.

3.3 COMPACTING TEST

- .1 For test compaction, use a standard tire roller with a gross weight of 45,400 kg, mounted on four (4) tires each carrying 11,350 kg, inflated to 620 kPa, mounted side by side with a gap is of 730 mm.
- .2 Obtain approval from Departmental Representative to use non-standard compaction equipment.
- .3 Perform test compaction at the level indicated for the underlayment layer. If the use of non-standard compaction equipment is approved, the post-compaction rating should be determined by the Departmental Representative.



- .4 Perform a number of compaction passes sufficient to subject each point of the surface to three (3) passes of a loaded tire.
- .5 If test compaction reveals defects in a part of the base course, proceed as follows:
 - .1 Remove sub-base and base layer materials to depth and area as indicated by Departmental Representative.
 - .2 Backfill the excavation made in the base layer with ordinary materials and then compact according to the requirements of this section.
 - .3 Replace subgrade materials and compact.
- .6 If test compaction reveals defects in a part of the sub-base, remove and replace inadequate materials in accordance with the requirements of this section at no additional charge.

3.4 TOLÉRANCES

- .1 Permitted deviation from the finished base layer is 20 mm greater or less than the prescribed level; This difference, whether more or less, cannot be uniformly high or low.

3.5 PROTECTION

- .1 Maintain the finished base in a condition consistent with the requirements of this section until the next layer is completed or the work is received by the Departmental Representative.



PART 1 GÉNÉRALITÉS

1.1 RELATED REQUIREMENTS

- .1 All sections of Divisions 01 - General Requirements and 02 - Existing Conditions
- .2 Section 31 23 33.01 –Excavation, Trenching and Backfilling
- .3 Section 31 05 16 –Aggregate Materials
- .4 All sections of Division 32 – Exterior Improvements

1.2 REFERENCES

- .1 American Association of State Highway and Transportation Officials (AASHTO)
 - .1 AASHTO M320-10, Standard Specification for Performance Graded Asphalt Binder.
 - .2 AASHTO R29-02, Standard Specification for Grading or Verifying the Performance Graded of an Asphalt Binder.
 - .3 AASHTO T245-97(2004), Standard Method of Test for Resistance to Plastic flow of Bituminous Mixtures Using Marshall Apparatus.
- .2 Asphalt Institute (AI)
 - .1 AI MS-2-1994 Sixth Edition, Mix Design Methods for Asphalt Concrete and Other Hot-Mix Types.
- .3 ASTM International
 - .1 ASTM C88-05, Standard Test Method for Soundness of Aggregates by Use of Sodium Sulphate or Magnesium Sulphate.
 - .2 ASTM C117-0], Standard Test Method for Material Finer Than 0.075mm (No.200) Sieve in Mineral Aggregates by Washing.
 - .3 ASTM C123-04, Standard Test Method for Lightweight Particles in Aggregate.
 - .4 ASTM C127-07, Standard Test Method for Specific Gravity and Absorption of Coarse Aggregate.
 - .5 ASTM C128-07a, Standard Test Method for Density, Relative Density (Specific Gravity), and Absorption of Fine Aggregate.
 - .6 ASTM C131-06, Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
 - .7 ASTM C136-06, Standard Method for Sieve Analysis of Fine and Coarse Aggregates.
 - .8 ASTM C207-2006, Standard Specification for Hydrated Lime for Masonry Purposes.
 - .9 ASTM D995--95b(2002), Standard Specification for Mixing Plants for Hot-Mixed, Hot-Laid Bituminous Paving Mixtures.
 - .10 ASTM D2419-09, Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate.



- .11 ASTM D3203-94(2005), Standard Test Method for Percent Air Voids in Compacted Dense and Open Bituminous Paving Mixtures.
- .12 ASTM D4791-05e1, Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate.
- .4 Canada Green Building Council (CaGBC)
 - .1 LEED Canada-NC, version 1.0-2004, LEED (Green Building Assessment System for New Construction and Major Renovations (Reference Kit) (including Addendum 2007) .
- .5 Canadian General Standards Board (CGSB)
 - .1 CAN / CGSB-8.1-88, Non-metric wire mesh screen.
 - .2 CAN / CGSB-8.2-M88, Wire mesh screen, metric.
 - .3 CAN / CGSB 16.3 M90, Bituminous binders for roads.
- .6 U.S. Environmental Protection Agency (EPA) / Office of Water
 - .1 EPA 832/R-92-005, Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.

1.3 SAMPLES

- .1 Inform the Departmental Representative of proposed source of aggregates and provide access for sampling one (1) week prior to beginning Work.
- .2 Submit samples of following materials proposed for use one (1) week prior to beginning Work.
 - .1 One 5 L container of asphalt cement.

1.4 MATERIAL CERTIFICATION

- .1 Submit viscosity-temperature chart for asphalt cement to be supplied showing either Saybolt Furol viscosity in seconds or Kinematic Viscosity in centistokes, temperature range 105 to 175 degrees C at least one (1) week prior to beginning Work.
- .2 Submit manufacturer's test data and certification that asphalt cement meets specification requirements.
- .3 Submit calibration charts for each hot load and each cold load.

1.5 SUBMITTAL OF MIX DESIGN

- .1 Submit asphalt concrete mix design and trial mix test results to the Departmental Representative at least one (1) week prior to beginning Work

1.6 DELIVERY AND STORAGE

- .1 Stockpile minimum 50 % of total amount of aggregate required before beginning asphalt mixing operation.
- .2 When necessary to blend aggregates from one or more sources to produce required gradation, do not blend in stockpiles.



- .3 When using a mixing drum dryer, stockpile fine aggregate separately from coarse aggregate.
- .4 Provide approved storage, heating tanks and pumping facilities for asphalt cement, and have them approved.

PART 2 PRODUCTS

2.1 MATERIALS

- .1 Performance graded asphalt cement: to AASHTO M320, grade PG 28, 58 when tested to AASHTO R29.
- .2 Recovery Coatings: n / a
- .3 Aggregates: in accordance with Section 31 05 16- Aggregate Materials and requirements as follows:
 - .1 Crushed stone or gravel.
 - .2 Gradations: within limits specified when tested to ASTM C136 and ASTM C117. Sieve sizes to CAN/CGSB-8.1, CAN/CGSB-8.2.
 - .3 Table

Seive Designation	% passing
	EB-10C
20 mm	
14 mm	100
10 mm	94 – 100
5 mm	66 – 78
2,5 mm	45 – 65
1.25 mm	30 – 50
0,630 mm	20 – 40
0.315 mm	14 – 29
0.160 mm	7 – 18
0,080 mm	4,0 – 10,0

- .4 Coarse aggregate: aggregate retained on 4.75 mm sieve and fine aggregate is aggregate passing 4.75 mm sieve when tested to ASTM C136.
- .5 When dryer drum plant or plant without hot screening is used, process fine aggregate through 4.75 mm sieve and stockpile separately from coarse aggregate.
- .6 Separate stockpiles for coarse and fine aggregates not required for sheet asphalt.
- .7 Do not use aggregates having known polishing characteristics in mixes for surface courses.
- .8 Sand equivalent: ASTM D2419. Min: 50.
- .9 Magnesium Sulphate soundness: to ASTM C88. Max % loss by mass:
 - .1 Coarse aggregate: 12%.
 - .2 Fine aggregate: 16%.



- .10 Los Angeles degradation: Grading B, to ASTM C131. Max % loss by mass:
 - .1 Coarse aggregate: 35%.
- .11 Absorption: to ASTM C127. Max % by mass:
 - .1 Coarse aggregate: 2.0%.
- .12 Loss by washing: to ASTM C117. Max % passing 0.075 mm sieve:
 - .1 Coarse aggregate: 2.0%.
- .13 Lightweight particles: to ASTM C123. Max % by mass less than 1.95 relative density:
 - .1 3.0%.
- .14 Flat and elongated particles: to ASTM D4791, (with length to thickness ratio greater than 5): Max % by mass:
 - .1 Coarse aggregate: 15%.
- .15 Crushed fragments: at least 60% of particles by mass within each of following sieve designation ranges, to have 1 minimum freshly fractured face. Material to be divided into ranges, using methods of ASTM C136.
- .16 Regardless of compliance with specified physical requirements, fine aggregates may be accepted or rejected on basis of past field performance.
- .4 Mineral filler:
 - .1 Ensure finely ground particles of limestone, hydrated lime, Portland cement or non-plastic mineral matter approved by Departmental Representative are thoroughly dry and free from lumps.
 - .2 Add mineral filler when necessary to meet job mix aggregate gradation or as directed by Departmental Representative to improve mix properties.
 - .3 Ensure mineral filler is dry and free flowing when added to aggregate.
- .5 Anti-stripping agent: hydrated lime to ASTM C207 type N.
 - .1 Add lime at rate of approximately 2-3 % of dry weight of aggregate.
- .6 Water: to approval of Departmental Representative.

2.2 EQUIPMENT

- .1 Pavers: mechanical grade controlled self-powered pavers capable of spreading mix within specified tolerances, true to line, grade and crown indicated.
- .2 Rollers: sufficient number of type and weight to obtain specified density of compacted mix.
- .3 Vibratory rollers:
 - .1 Drum diameter: 1200mm minimum.
 - .2 Amplitude of vibration (machine setting): 0.5 mm maximum for lifts less than 40 mm thick.
- .4 Haul trucks: sufficient number and of adequate size, speed and condition to ensure orderly and continuous operation.



- .5 Hand tools:
 - .1 Lutes or rakes with covered teeth for spreading and finishing operations.
 - .2 Tamping irons having mass 12 kg minimum and bearing area not exceeding 310 cm² for compacting material along curbs, gutters and other structures inaccessible to roller. Mechanical compaction equipment, when approved by , may be used instead of tamping irons.
 - .3 Straight edges, 4.5m in length, to test finished surface.
- .6 Plant testing facility: provide laboratory space at plant site for exclusive use of Departmental Representative, for performing tests, keeping records and making reports.

2.3 MIX DESIGN

- .1 Mix design to be approved in writing by Departmental Representative .
- .2 Mix design to be developed by testing laboratory approved in writing by Departmental Representative.
- .3 Design of mix: by Marshall method to requirements below.
 - .1 Compaction blows on each face of test specimens: 50.
 - .2 Mix physical requirements:

Property	Multi-purpose track
Tack (% min) EB 10C	5,2-
Marshall Stability at 60 degrees C kN min	9,0
Flow Value mm	2-4
Air Voids in Mixture, %	2-45
Voids in Mineral Aggregate, % min	15
Index of Retained Stability % minimum	75

- .1 Measure physical requirements as follows:
 - .1 Marshall load and flow value: to AASHTO T245.
 - .2 Compute void properties on basis of bulk specific gravity of aggregate to ASTM C127 and ASTM C128. Make allowance for volume of asphalt absorbed into pores of aggregate.
 - .3 Air voids: to ASTM D3203.
 - .4 Voids in mineral aggregates: to AI MS2.
- .2 Do not change job-mix without prior approval of Departmental Representative. When change in material source proposed, new job-mix formula to be approved by Departmental Representative
- .3 Return plant dust collected during processing to mix in quantities acceptable to Departmental Representative.





PART 3 EXÉCUTION

3.1 MATÉRIEL

- .1 Pavers: mechanical grade controlled, self-powered pavers, capable of spreading mix within specified tolerances, true to line, grade and crown indicated. Hydraulic extensions on paver is not permitted unless it is equipped with an auger, heating plates and vibrators. Augers must be at least 0.5 m from the exterior edge of the extension.
- .2 Rollers: sufficient number of type and weight to obtain specified density of compacted mix.
 - .1 Haul trucks: sufficient number and of adequate size, speed and condition to ensure orderly and continuous operation and as follows:
 - .1 Boxes with tight metal bottoms.
 - .2 Covers of sufficient size and weight to completely cover and protect asphalt mix when truck fully loaded.
 - .3 In cool weather or for long hauls, insulate entire contact area of each truck box.
 - .4 Use only trucks which can be weighed in single operation on scales supplied.
 - .3 Hand tools:
 - .1 Lutes or rakes with covered teeth for spreading and finishing operations.
 - .2 Tamping irons having mass 12 kg minimum and bearing area not exceeding 310 cm² for compacting material along curbs, gutters and other structures inaccessible to roller. Mechanical compaction equipment, when approved by the Departmental Representative, may be used instead of tamping irons.
 - .3 Straight edges, 4.5 m in length, to test finished surface.

3.2 PREPARATION OF SURFACES TO COVER

- .1 Prior to commencing spraying, clean and clear pavements of non-adherent or foreign substances.
- .2 Apply the tack coat to the granular surface after scarifying it to a depth of 25mm to facilitate penetration of the binder
- .3 Compact the MG 20 granular foundation to a minimum of 95% of the maximum dry density.

3.3 TRANSPORTATION OF MIX

- .1 Transport mix to job site in vehicles cleaned of foreign material.
- .2 Paint or spray truck beds with limewater, soap or detergent solution, or non-petroleum based commercial product, at least daily or as required. Lift bucket to drain any excess solution.
- .3 Schedule delivery of material for placing in daylight, unless the Departmental Representative approves artificial light for night placing.
- .4 Deliver material to paver at uniform rate and in an amount within capacity of paving and compacting equipment.



- .5 Deliver loads continuously in covered vehicles and immediately spread and compact. Deliver and place mixes at temperature within range as prescribed, but not less than 135 degrees C.

3.4 PLACING OF ASPHALT MIX

- .1 Obtain the Departmental Representatives approval of base, existing surface, tack coat prior to placing asphalt.
- .2 Place asphalt concrete to thicknesses, grades and lines as indicated on the drawings or as directed by the Departmental Representative.
- .3 Place asphalt mixtures only when air temperature is 5 degrees C minimum.
- .4 When temperature of surface on which material is to be placed falls below 10 degrees C, provide extra rollers as necessary to obtain required compaction before cooling.
- .5 Do not place hot-mix asphalt when pools of standing water exist on surface to be paved, during rain, or when surface is damp.
- .6 Apply asphalt paving in layers having the following thicknesses after compaction (see drawings):
 - .1 Multi-purpose track: single layer of 50 mm minimum.
- .7 Where possible do tapering and levelling where required in lower lifts. Overlap joints by not less than 300 mm. Verification of the profile must be done regularly by the Contractor with a 4.5 m straight edge.
- .8 Where more than one layer of asphalt concrete is required, spread a fine skin of tack between the layers, according to the Agency Representatives directions.
- .9 Place individual strips no longer than 500 m.
- .10 Commence spreading at high side of pavement or at crown and span crowned centerlines with initial strip.
- .11 Spread and strike off mixture with self-propelled mechanical finisher.
 - .1 Construct longitudinal joints and edges true to line markings. The Departmental Representative to establish lines for paver to follow parallel to centerline of proposed pavement. Position and operate paver to follow established line closely.
 - .2 When using pavers in echelon, have first paver follow marks or lines, and second paver follow edge of material placed by first paver. Work pavers as close together as possible and in no case permit them to be more than 30 m apart.
 - .3 If segregation occurs, immediately suspend spreading operation until cause is determined and corrected.
 - .4 Correct irregularities in alignment left by paver by trimming directly behind machine.
 - .5 Correct irregularities in surface of pavement course directly behind paver. Remove excess material forming high spots using shovel or lute. Fill and smooth indented areas with hot mix. Do not broadcast material over such areas.
 - .6 Do not throw surplus material on freshly screed surfaces.



- .12 When hand spreading is used:
- .1 Use approved wood or steel forms, rigidly supported to assure correct grade and cross section. Use measuring blocks and intermediate strips to aid in obtaining required cross-section.
 - .2 Distribute material uniformly without broad casting material.
 - .3 During spreading operation, thoroughly loosen and uniformly distribute material by lutes or covered rakes. Reject material that has formed into lumps and does not break down readily.
 - .4 After placing and before rolling, check surface with templates and straightedges and correct irregularities.

3.5 COMPACTION

- .1 Compact the asphalt paving continuously until a density equal to at least 98% of the density of the Marshall test sample taken from the mixture used is obtained. The joints shall be compacted to a minimum of 96% of the density of the Marshall test sample taken from the mixture.

3.6 JOINTS

- .1 General:
 - .1 Prepare the vertical face to supply straight surfaces and profiles on which can be posed a new covering. Eliminate all non-adherent substances.
 - .2 All cold joints, when the temperature is less than 80°C, longitudinal and transversal must be heated before the placing of asphalt concrete with an infrarouge heating device. The heating equipment must be installed on the paver and designed for the type of work. The equipment must heat the joints between 80°C and 120°C. The equipment must be approved by the Departmental Representative.
 - .3 Overlap by 100 mm on previous strip laid by the paver.
 - .4 Remove surplus material from surface of previously laid strip. Do not deposit on surface of freshly laid strip.
 - .5 Construct joints between asphalt concrete pavement and Portland cement concrete pavement as indicated.
 - .6 Paint contact surfaces of existing structures such as manholes, curbs or gutters with bituminous material prior to placing adjacent pavement.
- .2 Transverse joints:
 - .1 Place and compact transverse joints to provide smooth riding surface.
 - .2 Offset joints by at least 2 m.
 - .3 Offset transverse joint in succeeding lifts by at least 600 mm.
 - .4 Cut back to full depth vertical face and tack face with thin coat of hot asphalt prior to continuing paving.



- .3 Longitudinal joints:
 - .1 Before rolling, carefully remove and discard coarse aggregate in material overlapping joint with lute or rake.
 - .2 Roll longitudinal joints directly behind paving operation.
 - .3 During rolling with a static roller, overlap the new strip along a maximum width of 100 to 150 mm and then operate the roller to firmly pack fine particles across the width of the joint. Continue rolling until the seal is fully and properly compacted
 - .4 During rolling with a vibrating roller, place the roller so that substantially all of the drum is on the new path with no more than 100 to 150 mm wide overlapped on the previously laid and compacted strip.
 - .5 Shift of at least 150 mm, the longitudinal seal in successive layers.
 - .6 Construct feather joints so that thinner portion of joint contains fine graded material obtained by changed mix design or by raking out coarse aggregate in mix. Place and compact joint to ensure joint is smooth and without visible breaks in grade. Locate feather joints as indicated.

3.7 FINISH TOLERANCES

- .1 Each layer, inferior and superior must have a uniform texture, a firm surface without segregation and pitting, be regular and compliant to the transvers and longitudinal profiles specified.
- .2 After final rolling of each layer, the Departmental Representative will check the slopes and surfaces. Finished asphalt surface to be within 5 mm of design elevation but not uniformly high or low. Finished asphalt surface not to have irregularities exceeding 5 mm when checked with 4.5m straight edge placed in any direction. The thickness of each layer must not vary more than 5 mm the average thickness specified by the rate of placement specified per square meter, this being transformed to thickness with the help of the net average density obtained during the compaction measurement.
- .3 The verification of these irregularities is done with a 4.5 m straight edge that the Contractor must have at all times at the work site.

3.8 DEFECTIVE WORK

- .1 The Contractor shall correct deficiencies of Article 3.7 that occur before the end of compacting, by loosening the asphalt mixture and adding or removing materials as needed. If these irregularities or these defects remain, even after the final compaction, quickly remove the top layer and spread a new layer of material to obtain an even and smooth surface and compact immediately to the specified density.
- .2 The Contractor shall, at his own expense, repair areas that have signs of cracking or undulations.
- .3 All surfaces which present segregation are found to be defective and should be repaired at the expense of the Contractor.
- .4 The Contractor shall, at his own expense, correct noncompliant level adjustments under Article 3.8 of the surface of the asphalt and the places that hold water surface.



- .5 Adjust roller operation and screed settings on paver to prevent further defects such as rippling and checking of pavement.
- .6 The specifications concerning the physical characteristics mentioned in this specification must be met during production. The paving whose mixture does not meet the requirements of sections 3.1.4, 3.6.1 and the percentage of empty spaces will be judged defective and therefore rejected, unpaid and must be replaced by paving which conforms to the specifications, at the expense of the Contractor.

3.9 QUALITY CONTROL

- .1 Control by the Contractor
 - .1 The Contractor shall provide at his expense the analysis results for at least one sample of the asphalt product. The sample must be taken together with the laboratory of Parks Canada Agency. A comprehensive analysis should be performed on this sample. .
 - .2 Briquettes (4) shall be made of manually on site by applying 50 strokes / face and without heating samples of asphalt concrete.

3.10 CLIMATIC CONDITIONS

- .1 Install bituminous concrete when ambient temperature permits the construction of bituminous coatings in accordance with the requirements of drawings and specifications. The Departmental Representative reserves the right to stop work if the climatic conditions do not seem to him favorable, particularly when the surface temperature is less than 5 ° C.
- .2 The application of asphalt paving is prohibited when the surface to be covered is wet, covered with puddles or mud.

3.11 ALIGNMENTS AND PROFILES

- .1 Implementation of asphalt paving shall be carried out in accordance with the alignments, profiles and sections specified in the plans and specifications and/or instructions of the Departmental Representative. Implantation in the field is to be done from the benchmarks provided to the drawings

3.12 REWORK

- .1 Any paving considered by the Departmental Representative as unsuccessful (joints, mixtures, laying, profiles, etc.) must be redone by the Contractor to the satisfaction of the Departmental Representative, with no additional charges.

3.13 TRAFFIC

- .1 The movement of vehicles shall be controlled by the Contractor so that it is not carried out on the fresh paving as long as the surface has not cured.
- .2 Provide adequate signage at the ends and along the work area to ensure proper traffic control.

**3.14 MACHINERY**

- .1 The Departmental Representative reserves the right to require the replacement or modification of any part of machinery that he considers to be inadequate. Provide the appropriate machinery for the operations described in the drawings and specifications in order to obtain top quality work.

3.15 CLEANING

- .1 Progress Cleaning: clean in accordance with Section 01 74 11- Cleaning.
 - .1 Leave Work area clean at end of each day.
- .2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11- Cleaning.



PART 1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 All of the sections of the division 32 – Exterior Improvements

1.2 REFERENCE STANDARDS

- .1 Environment Canada(EC)
 - .1 Volatile Organic Compound (VOC) Limiting Regulations for Architectural Coatings (SOR/2009-264).
- .2 Green Seal (GS)
 - .1 GS-11-2013, Standard for Paints and Coatings.
- .3 Health Canada - Workplace Hazardous Materials Information System (WHMIS)
 - .1 Material Safety Data Sheets (MSDS).
- .4 Master Painters Institute (MPI)
 - .1 Architectural Painting Specification Manual – current edition.
- .5 South Coast Air Quality Management District (SCAQMD)
 - .1 SCAQMD Rule 1113-13, Architectural Coatings.

1.3 DOCUMENTS/SAMPLES TO BE SUBMITTED FOR APPROVAL / INFORMATION

- .1 Submit required documents and samples in accordance with Section 01 33 00- Documents / Samples to be submitted.
- .2 Datasheets
 - .1 Submit required data sheets and manufacturer's documentation for pavement markup. The data sheets must indicate the characteristics of the products, the performance criteria, the dimensions, the stresses and the finish.
 - .2 Submit required data sheets and manufacturer's instructions and documentation for each type of abrasive and solvent used in the project.
 - .3 Submit two (2) copies of MSDSs required under WHMIS in accordance with Section 01 35 43- Environmental Protection
- .3 Documents / Submissions for Sustainable Design
 - .1 LEED Canada Certification Requirements: as per Section 01 35 21- LEED Requirements.
 - .2 Construction Waste Management
 - .1 Submit waste management plan established for the project, which shall specify the recycling and recovery requirements.
 - .3 Low-Emitting Materials: Submit a list of the paints and coatings used to produce pavement markings, which must comply with the limits and restrictions on their VOC content and chemical composition.



1.4 TRANSPORT, STORAGE AND HANDLING

- .1 Transport, storage and handling of materials and equipment in accordance with manufacturer's written instructions
- .2 Delivery and Acceptance: Deliver materials and equipment to the site in their original packaging, which must be labeled with the name and address of the manufacturer.
- .3 Storage and Handling
 - .1 Store equipment and materials in a clean, dry, well-ventilated area as recommended by the manufacturer.
 - .2 Replace damaged materials and equipment with new materials and equipment
- .4 Management of packaging waste: Recover waste as directed by the Construction Waste Management Plan.

1.5 CONDITIONS OF IMPLEMENTATION

- .1 Provisions on Sustainable Design
 - .1 Seasonal Restriction for Coatings to Delineate High VOC Flows
 - .1 Coatings used to delineate circulations applied between May 1 and October 15 shall be seasonally restricted and shall not have a VOC concentration greater than 150 g/L.

PARTIE 2 PRODUCT

2.1 EQUIPMENT/MATERIAL

- .1 Paints and Markings
 - .1 Epoxy resin product according to MPI recommendations
 - .2 Product with a VOC content of 150 g / L or less in accordance with SOR / 2009-264, Appendix 1
 - .3 ASTM D913 Product with 100% durability at installation and 85% after one year
 - .4 Color certified by the MPI
 - .5 Brand-name products recognized or on a list of approved products. Where appropriate, the Departmental Representative reserves the right to conduct further testing.
- .2 Thinner: supplied by manufacturer recognized by MPI.
- .3 Abrasives
 - .1 Abrasive products and solvents used to remove marking lines, paint, oil, grease or rubber deposits shall be patented products specially designed for the removal of marking and/or cleaning of roadways and approved by the Departmental Representative.



PARTIE 3 EXECUTION

3.1 EXAMINATION

- .1 Verification of existing conditions: Before marking roads, ensure that the condition of surfaces / supports previously implemented under other sections or contracts are acceptable and allow work to be carried out in accordance with the instructions of MPI.
 - .1 Perform visual inspection of surfaces in the presence of the Departmental Representative
- .2 Pavement surface: dry, free of water, frost, ice, dust, oil, grease and other harmful material.
- .3 Begin work on marking only after correcting unacceptable conditions
- .4 Ground marking work shall not be carried out if:
 - .1 The soil to be marked is moist
 - .2 Paint may be wet by rain before drying time
 - .3 Coating temperature is below dew point + 2 ° C
 - .4 Air temperature is below 10 ° C
 - .5 The soil to be marked is contaminated by various dirt which may impair the adhesion of the marking product

3.2 EQUIPMENT

- .1 Use approved marking equipment that can apply paint consistently in a continuous line into two continuous lines and discontinuous lines. The equipment shall be capable of applying the marking products uniformly at the prescribed rates of application and dimensions and shall be equipped with an efficient and fast acting device for interrupting the projection.

3.3 REMOVAL OF PAVEMENT MARKINGS

- .1 In areas limited by the Departmental Representative, remove painted pavement marks and rubber deposits by any method approved in writing by the Departmental Representative.

3.4 REMOVAL OF PAVEMENT MARKINGS

- .1 Remove extra sealant at locations indicated by Departmental Representative.
- .2 Dispose of product residues as directed by Departmental Representative.
- .3 Remove oil, grease, dust, contaminants, loose particles and foreign substances from designated surfaces using a method approved in writing by the Departmental Representative
- .4 Complete cleaning with a hand-held brush

3.5 PAVEMENT MARKING

- .1 Begin pavement marking within 7 days following paving completion.
- .2 Having at all times a system for controlling quantities of applied products.
- .3 Perform marking of longitudinal lines, directional arrows, symbols as shown on drawings.



- .4 Marking arrows and symbols using rigid templates. It is forbidden to use adhesive tapes to trace the shapes on the ground. Approve any other method to be proposed by the contractor.
- .5 Unless otherwise specified by Departmental Representative, apply paint only when wind speed is less than 30 km/h, air temperature is above 10 degrees Celsius and no rain within four (4) hours
- .6 Observe manufacturer's installation rate
- .7 Do not dilute paint unless authorized by Departmental Representative.
- .8 Maintain a uniform tint and density for all painted lines.
- .9 Keep clear and sharp boundaries
- .10 Maintain permissible deviations of dimensions of markings by 12 mm above or below the dimensions indicated.
- .11 Remove inaccurate markings to minimize damage to pavement surface using approved methodology by Departmental Representative.
- .12 The high voltage water erasure technique is used; separate the erasure and marking operations from a minimum of 12 hours.

3.6 CLEANING

- .1 Clean work area at the end of each working day.
- .2 Remove surplus equipment and material from site.

3.7 PROTECTION

- .1 Protect markings until paint is dry.
- .2 Repair damage to adjacent surfaces attributable to pavement marking work.



PART 1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 All sections of Divisions 01 - General Requirements
- .2 Section 31 23 33.01 – Excavating, Trenching and Backfilling.
- .3 Section 32 92 23 – Sodding

1.2 REFERENCE STANDARDS

- .1 Agriculture and Agri-Food Canada
 - .1 The Canadian System of Soil Classification, Third Edition, 1998.
- .2 Canadian Council of Ministers of the Environment
 - .1 PN1340-2005, Guidelines for Compost Quality

1.3 DEFINITIONS

- .1 Compost
 - .1 Mixture of soil and decomposing organic matter used as fertilizer, mulch, or soil conditioner.
 - .2 Compost is processed organic matter containing 40% or more organic matter as determined by Walkley-Black or Loss On Ignition (LOI) test.
 - .3 Product must be sufficiently decomposed (i.e. stable) so that any further decomposition does not adversely affect plant growth (C:N ratio below (25) (50)), and contain no toxic or growth inhibiting contaminants.
 - .4 Composed bio-solids to: CCME Guidelines for Compost Quality, Category (A).

1.4 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Provide submittals in accordance with Section 01 33 00- Submittal Procedures.
- .2 Documents to be submitted for quality control purposes
 - .1 Soil Testing: Submit test reports certifying that the products, equipment and materials meet the Physical Characteristics and Performance Requirements in accordance with PART 2 QUALITY CONTROL OF SOURCE.
 - .2 Certificates: submit the documents signed by the manufacturer, certifying that the products, equipment and materials meet the requirements regarding physical characteristics and performance criteria.

1.5 QUALITY CONTROL

- .1 The Departmental Representative may request the sampling and analysis of soil samples or mixtures of soil at source or on site.



- .2 Notify Departmental Representative of proposed sources of topsoil at least fifteen (15) days prior to commencement of work to permit testing. Only one source of supply is accepted.
- .3 Contractor shall be responsible for soil testing and shall determine the requirements for the use of soil improvers in order to promote the growth of grass. He must provide, at his own expense, an analysis from an independent and recognized soil laboratory accompanied by agronomic recommendations, if required. All required at least fifteen (15) days prior to commencement of work.
- .4 Approval of topsoil and certificate of compliance prior to spraying. All works of soil and anything necessary to meet the requirements of the topsoil are at the expense of the Contractor.

1.6 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate waste materials for reuse in accordance with Section 01 74 21-Construction/Demolition Waste Management and Disposal.
- .2 Divert unused soil amendments from landfill to official hazardous material collections site approved by Departmental Representative.
- .3 Do not dispose of unused soil amendments into sewer systems, into lakes, streams, onto ground or in locations where it will pose health or environmental hazard.

PART 2 PRODUCTS

2.1 TOPSOIL

- .1 Topsoil for planting beds seeded areas: mixture of particulates, micro-organisms and organic matter which provides suitable medium for supporting intended plant growth.
 - .1 Soil texture based on The Canadian System of Soil Classification, to consist of 20 to 70% sand, minimum 7% clay, and contain 4 to 10% organic matter by weight and a pH between 6 and 7 (Walkley Black method)
 - .2 Contain no toxic elements or growth inhibiting materials.
 - .3 Finished surface free from:
 - .1 Debris and stones over 50 mm diameter.
 - .2 Course vegetative material, 10 mm diameter and 100 mm length, occupying more than 2% of soil volume.
 - .4 Consistence: friable when moist.
 - .5 The mixture must be sieved, free from contaminants (pesticides, hydrocarbons, etc.), pebbles or rods exceeding 50 mm in diameter, woody debris and living plant material such as quack grass, thistle etc.
 - .6 All mix will come from outside the work site and must be screened beforehand from a recognized site. No black soil will be accepted.
 - .7 Chemical Elements:
 - .1 phosphorus ass. : 50-150 kg / ha;
 - .2 potassium. : 250-350 kg / ha;



- .3 calcium : 6,000-9,000 kg / ha;
- .4 magnesium: 250-350 kg / ha.
- .8 Standard field soil analysis.
- .9 Add to soil at least 4 kg/70 m² of 3-4-3 composted fertilizer and incorporate into soil with rake.
- .10 For flowerbeds/planting areas and lawns, apply the soil improver and mix thoroughly. Respect the proportions specified by the manufacturer.

2.2 SOIL AMENDMENT PRODUCTS

- .1 Fertilizer:
 - .1 Fertility: major soil nutrients present in following amounts:
 - .2 Nitrogen (N): 20 to 40micrograms of available N per gram of topsoil.
 - .3 Phosphorus (P): 40 to 50micrograms of phosphate per gram of topsoil.
 - .4 Potassium (K): 75 to 110micrograms of potassium per gram of topsoil.
 - .5 Calcium, magnesium, sulphur and micro-nutrients present in balanced ratios to support germination and/or establishment of intended vegetation.
 - .6 Ph value: 6.5 to 8.0.
- .2 Peat moss:
 - .1 Derived from partially decomposed species of Sphagnum Mosses.
 - .2 Elastic and homogeneous, brown in colour.
 - .3 Free of wood and deleterious material which could prohibit growth.
 - .4 Shredded particle minimum size: 5mm.
- .3 Sand: washed coarse silica sand, medium to course textured.
- .4 Organic matter: compost Category A, in accordance with CCME PN1340, unprocessed organic matter, such as rotted manure, hay, straw, bark residue or sawdust, meeting the organic matter, stability and contaminant requirements.
- .5 Use composts meeting Category B requirements for land fill reclamation and large scale industrial applications.
- .6 Limestone:
 - .1 Ground agricultural limestone.
 - .2 Gradation requirements: percentage passing by weight, 90% passing 1.0 mm sieve, 50% passing 0.125 mm sieve.
- .7 Fertilizer: industry accepted standard medium containing nitrogen, phosphorous, potassium and other micro-nutrients suitable to specific plant species or application or defined by soil test.



2.3 SOURCE QUALITY CONTROL

- .1 Advise Departmental Representative of sources of topsoil to be utilized with sufficient lead time for testing.
- .2 Contractor is responsible for amendments to supply topsoil as specified.
- .3 Soil testing by recognized testing facility for PH, P and K, and organic matter.
- .4 Testing of topsoil will be carried out by testing laboratory designated by Departmental Representative.
 - .1 Soil sampling, testing and analysis to be in accordance with Provincial standards.

PART 3 EXECUTION

3.1 TEMPORARY EROSION AND SEDIMENTATION CONTROL

- .1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to watercourse, according to requirements of authorities having jurisdiction.
- .2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.
- .3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.2 TOPSOIL STRIPPING

- .1 Begin topsoil stripping of areas as indicated after area has been cleared of brush and removed from site.
- .2 To store for re-use, stripped topsoil meeting the requirements of section 2.1 in the form of a pile in a designated area approved by the Departmental Representative;
- .3 Avoid mixing topsoil with subsoil where textural quality will be moved outside acceptable range of intended application.
- .4 Disposal of unused topsoil is to be in an environmentally responsible manner but not used as landfill as directed by the Departmental Representative.
- .5 Protect stockpiles from contamination and compaction.

3.3 PREPARATION OF EXISTING FOUNDATION SOIL

- .1 Verify that grades are correct.
 - .1 If discrepancies occur, notify the Departmental Representative and do not commence work until instructed by Departmental Representative.
 - .2 Ensure proper depth of excavation and, for this purpose, the contractor must take into account that the thickness of topsoil, after compaction, must be 150 mm.



- .3 Excavate and scarify to a depth of at least 150mm depth all granular foundation surfaces of the temporary cycling path to be dismantled and other places where the topsoil is to be placed after dismantling paving.
- .4 Level the soil by eliminating troughs and roughness and giving it a slope that promotes good water flow. Surface runoff occurs in the direction of existing slopes unless otherwise stated.
- .2 Remove debris, roots, branches, stones in excess of 50 mm diameter and other deleterious materials.
 - .1 Remove soil contaminated with calcium chloride, toxic materials and petroleum products.
 - .2 Remove debris which protrudes more than 75 mm above surface.
 - .3 Dispose of removed material off site.
- .3 Cultivate entire area which is to receive topsoil to minimum depth of 150 mm.
 - .1 Cross cultivate those areas where equipment used for hauling and spreading has compacted soil.
- .4 If, due to climate or traffic, beads, depressions, crevices or furrows are created, the contractor shall restore the surfaces.

3.4 PLACING AND SPREADING OF TOPSOIL/PLANTING SOIL

- .1 Place topsoil after the Departmental Representative has accepted subgrade.
- .2 Spread topsoil in uniform layers not exceeding 150 mm. after settlement. Consider the thickness of the sod in order to obtain the right elevations
- .3 Topsoil should be recovered for replacement.
- .4 Spread the topsoil and planting soil according to the following minimum layer thicknesses after settlement:
 - .1 150 mm for grassed areas;
 - .2 450 mm for shrubs;
 - .3 900 mm for the trees.
- .5 Level of topsoil to 15 mm from final soil level to apply sod tiles to correct elevation.
- .6 Manually spread topsoil/planting soil around trees, shrubs and obstacles.
- .7 Any form of seeding is prohibited.
- .8 Plant soil must be packed but not densified.
- .9 The soil compaction is compacted using a hand roller weighing not more than 150 kg. Never correct the beads or depressions with the roller. Take into account a settlement of about 25% by volume when placing the topsoil.

3.5 FINISH GRADING

- .1 Grade to eliminate rough spots and low areas and ensure positive drainage.
 - .1 Prepare loose friable bed by means of cultivation and subsequent raking.



- .2 All this finishing work is done manually with the rake.
- .2 Consolidate topsoil to leave surfaces smooth, uniform and firm against deep footprinting.
- .3 Install sod as soon as possible after finishing

3.6 ACCEPTANCE

- .1 The Departmental Representative will inspect and test topsoil in place and determine acceptance of material, depth of topsoil and finish grading.

3.7 SURPLUS MATERIAL

- .1 Dispose of materials except topsoil not required where directed by the Departmental Representative.

3.8 CLEANING

- .1 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.



PART 1 GENERAL

1.1 RELATED REQUIREMENTS

- .1 All sections of Divisions 01 - General Requirements
- .2 Section 31 23 33.01 -. Excavation, Trenching and Backfilling.
- .3 Section 32 91 19.13 - Topsoil Placement and Grading

1.2 ADMINISTRATIVE REQUIREMENTS

- .1 Scheduling:
 - .1 Schedule sod laying to coincide with preparation of soil surface.
 - .2 Schedule sod installation when frost is not present in ground.
 - .3 Pre-installation meetings: conduct pre-installation meeting to verify project requirements, installation instructions and warranty requirements in accordance with Section 01 31 19 – Project Meetings.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

- .1 Submit in accordance with Section 01 33 00 – Submittal Procedures.
- .2 Product Data:
 - .1 Submit manufacturer's instructions, printed product literature and data sheets for sod, geotextile and fertilizer. Product documentation must include product characteristics, performance criteria, physical size, finish and limitations.
 - .2 Submit two copies of WHMIS MSDS in accordance with Section 01 35 29 06 – Health and Safety Requirements.
- .3 Certificates: submit product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements of seed mix, seed purity, and sod quality.
- .4 Test Reports: submit certified test reports showing compliance with specified performance characteristics and physical properties of seed mix, seed purity, and sod quality.
- .5 Provide results of eco-toxicological and environmental characterisation analyses of the topsoil in order to certify that the topsoil respects the CCME for use in Residential/Parc applications

1.4 COMPETENCIES

- .1 Subcontractor in landscaping: must be a member in good standing of the horticultural trade association.
- .2 Plantation Supervisor: Landscaping technician certified in plantation of plants.
- .3 Landscaping Supervisor: Landscaping technician certified in turf maintenance.



1.5 TRANSPORTATION, STORAGE AND HANDLING

- .1 Establish delivery schedule to minimize on-site storage without causing delays in completion of work.
- .2 Sod tiles shall be delivered within 24 hours of collection and must be lain within 36 hours from the same time.
- .3 Small, asymmetric or broken sod tiles are prohibited.
- .4 In wet weather, allow sod tiles to dry sufficiently so that they do not break when they are collected and handled.
- .5 In dry weather, protect sod tiles so that they do not dry completely and water them sufficiently to maintain vitality and prevent the soil from becoming loose during handling. Dry sod tiles will be refused.
- .6 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .7 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .8 Storage and Handling Requirements:
 - .1 Store materials in accordance with supplier's recommendations.
 - .2 Replace defective or damaged materials with new.

PART 2 PRODUCTS

2.1 MATERIALS

- .1 Number one turf grass nursery sod: sod that has been specially sown and cultivated in nursery fields as turf grass crop.
 - .1 Turf grass nursery sod types:
 - .1 Conventional grass, Kentucky bluegrass, fescue number one: grown solely from seed mixtures of Kentucky bluegrass cultivars and red-flowing fescues or tracery red fescues, and containing at least 40% cultivars Kentucky bluegrass and 30% turfgrass or tracery, in width of 450 mm.
 - .2 Number One Named Cultivars: Nursery Sod grown from certified seed.
 - .2 Turf Grass Nursery Sod quality:
 - .1 Not more than 1 broadleaf weed and up to 1% native grasses per 40 square metres.
 - .2 Density of sod sufficient so that no soil is visible from height of 1500 mm when mown to height of 50 mm.
 - .3 Mowing height limit: 35 to 65 mm.
 - .4 Soil portion of sod: 6 to 15 mm in thickness.



- .2 Commercial grade cultivated turf:
 - .1 Grass shall be mowed at the specified height within 36 hours of collection; The mowing residue must be removed.
- .3 Lawn care products
 - .1 Biodegradable Woven Geotextile, 20mm square mesh
 - .2 Beveled wood stakes of 19 x 19x 300mm
- .4 Good quality water for germination and plant growth. Salt water and water from peat bogs are prohibited.
- .5 Fertilizer:
 - .1 To Canada Fertilizers Act and Fertilizers Regulations.
 - .2 Complete, synthetic, slow release with 65% of nitrogen content in water-insoluble form.

2.2 SOURCE QUALITY CONTROL

- .1 Obtain written approval from the Departmental Representative of sod at source.
- .2 When proposed source of sod is approved, use no other source without written authorization from the Departmental Representative.

PART 3 EXECUTION

3.1 INSTALLERS

- .1 Use member installers in good standing of the Horticultural Trades Association

3.2 EXAMINATION

- .1 Verification of conditions: verify that conditions of substrate previously installed under other sections or contracts are acceptable for sod installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in the presence of the Departmental Representative.
 - .2 Inform the Departmental Representative of unacceptable conditions immediately upon discovery.
 - .3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from the Departmental Representative.

3.3 PREPARATION

- .1 Verify that grades are correct and prepared in accordance with Section 32 91 19 13 – Topsoil Placement and Grading. If discrepancies occur, notify the Departmental Representative and do not commence work until instructed by Departmental Representative.
- .2 Do not perform work under adverse field conditions such as frozen soil, excessively wet soil or soil covered with snow, ice, or standing water.



- .3 Fine grade surface free of humps and hollows to smooth, even grade, elevations indicated to tolerance of plus or minus 15 mm, surface draining naturally.
- .4 Remove and dispose of weeds, debris, stones 50 mm in diameter and larger, soil contaminated by oil, gasoline and other deleterious materials, off site.
- .5 Adjust soil pH between 6 and 7. If necessary, loosen soil 50 mm deep and incorporate lime

3.4 SOD PLACEMENT

- .1 Apply fertilizer uniformly to grass surfaces shown on plans and as directed by Departmental Representative prior to laying sod tiles.
- .2 Ensure sod placement is done under supervision of certified Landscape Planting Supervisor.
- .3 Lay sod within 24 hours of being lifted if air temperature exceeds 20 degrees C, If not a maximum of 36 hours. In hot weather, moisten the soil before placing the tiles.
- .4 Lay sod sections in rows, joints staggered. Butt sections closely without overlapping or leaving gaps between sections. Cut out irregular or thin sections with sharp implements.
- .5 Roll sod as directed by the Departmental Representative. Provide close contact between sod and soil by light rolling. Use of heavy roller to correct irregularities in grade is not permitted.
- .6 Water thoroughly throughout laying.
- .7 Install sod on same day as receiving it.
- .8 After laying, water thoroughly until soaked. (± 5 liters/m²).
- .9 Water regularly after installation in accordance with local bylaws.

3.5 INSTALLATION OF SOD TILES ON SLOPES AND PICKETTING

- .1 Place biodegradable geotextile in location indicated and properly secured according to manufacturer's instructions.
- .2 Begin laying sod tiles at the bottom of slopes by placing them perpendicular to slopes.
- .3 Planting stakes in sod tiles on steep slopes with a gradient greater than 1/3 and in tiles less than 1 m from sewer inlets and Less than 1 m of canals and evacuation ditches. Arrange the stakes as follows:
 - .1 200 mm of center distance, 100 mm from the top edge of the first plates covering the profile of the slope;
 - .2 at least three (3) to six (6) stakes per square meter;
 - .3 at least six (6) to nine (9) stakes per square meter, in the case of surfaces adjacent to storm drainage works;
 - .4 plant the stakes so that they extend 20 mm above the ground surface.

3.6 FERTILIZATION PROGRAM

- .1 Apply fertilizer during lawn establishment and warranty periods as detailed below.
 - .1 beginning of May: 2.4 kg / 100 m² of type 21-3-9 fertilizer;



- .2 mid-June: 2.4 kg / 100 m² of type 21-3-9 fertilizer;
- .3 end of August: 3.0 kg / 100 m² of fertilizer type 10-25-10.

3.7 CLEANING

- .1 Progress cleaning: clean in accordance with Section 01 74 11 – Cleaning.
 - .1 Leave Work area clean at end of each day.
 - .2 Keep pavement and area adjacent to site clean and free of mud, dirt, and debris at all times.
- .2 Final cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 – Cleaning.
 - .1 Clean and reinstate areas affected by Work.

3.8 PROTECTION BARRIERS

- .1 Protect newly sodded areas from deterioration with snow fence on rigid frame as directed by the Departmental Representative.
- .2 Remove protection two (2) weeks after installation following inspection as directed by the Departmental Representative.

3.9 MAINTENANCE DURING ESTABLISHMENT PERIOD

- .1 Perform following operations from time of installation until acceptance.
 - .1 Immediately irrigate tiles after laying until the first 25 mm of soil under the tile is completely moist.
 - .2 Keep the soil moist at all times during the first week following the installation of the tiles
 - .3 Water sodded areas in sufficient quantities and at frequency required to maintain optimum soil moisture condition to depth of 75 to 100 mm.
 - .4 Cut grass to 50 mm when or before it reaches a height of 75 mm.
 - .5 Maintain sodded areas weed free 95%.
 - .6 Fertilize sodded areas in accordance with supplier's recommendations. Spread half of required amount of fertilizer in one direction and remainder at right angles, and water in well.
 - .7 Temporary barriers or signage to be maintained where required to protect newly established sod.

3.10 ACCEPTANCE

- .1 Turf Grass Nursery Sod areas will be accepted by the Departmental Representative provided that:
 - .1 Sodded areas are properly established.
 - .2 Sod is free of bare and dead spots.



- .3 No surface soil is visible from height of 1500 mm when grass has been cut to height of 50 mm.
- .4 Sodded areas have been cut minimum 2 times prior to acceptance.
- .2 Areas sodded in fall will be accepted in following spring one month after start of growing season provided acceptance conditions are fulfilled.
- .3 When environmental conditions allow, all sodded areas showing shrinkage cracks shall be top-dressed and seeded with a seed mix matching the original.

3.11 MAINTENANCE DURING WARRANTY PERIOD

- .1 Perform following operations from time of acceptance until end of warranty period. The period of warranty and maintenance is 1 year starting from the final acceptance of the works.
 - .1 Water sodded Turf Grass Nursery Sod areas at weekly intervals to obtain optimum soil moisture conditions to depth of 100 mm.
 - .2 Repair and re-sod dead or bare spots to satisfaction of the Departmental Representative.
 - .3 Cut grass and remove clippings that will smother grass as directed by the Departmental Representative to height as follows:
 - .1 Turf Grass Nursery Sod: cut to 50 mm during normal growing conditions.
 - .2 Cut grass at 2 week intervals or as directed by the Departmental Representative, but at intervals so that approximately one third of growth is removed in single cut.
 - .3 Eliminate weeds by mechanical means to extent acceptable to the Departmental Representative.